RCA Victor

SERVICE NOTES

for

1939

Radio Receivers

Victrolas

Television

Test Equipment

Service Division

RCA Manufacturing Company, Inc.

Camden, N. J., U. S. A.

RCA Victor

SERVICE NOTES for 1939

Radio Receivers - Victrolas - Television - Test Equipment

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.
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First Edition

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HF-4	RC-354A	1938
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4QB	RC-440	1939
4QB4	RC-440A	1939
R-4		1931-32
4T		1936
T 4-8		1935
T 4-8A		1935
T 4-9		1935
T 4-9A		1935
T 4-10		1935
4X		1936
4X3		1936
4X4		1936
Radiola V		1923-28
AVR-5A		1934
5BT		1936
5M		1936
5Q1	RC-315C	1938
5Q2	RC-325C	1938
5Q2X	RC-325D	1938
5Q4	RC-366	1938
5Q5	RC-396, RC-477	1939
5Q6	RC-477A	1939
5Q8	RC-396B, RC-477B	1939
5Q55	RC-396	1939
5Q56	RC-396	1939
R-5		1931-32
R-5 D.C.		1931-32
R-5X		1931-32
T-5		1931-32
5T		1936
5T1		1937
T 5-2		1935
5T4		1936
5T5		1936
5T6		1937
5T7		1937
5T7-0		1937
5T8		1937
TRK-5		1938
TRK-5	50-60 cycle supplement	1939
TT-5		1938
TT-5	50-60 cycle supplement	1939
5U		1936
5X		1936
5X2		1936
5X3		1936
5X4		1936
5X5W	RC-406	1939
5X5I	RC-406A	1939
5XA		1936
5XA3		1936
5XA4		1936
Radiola VI		1923-28
BC 6-4		1935
BC 6-6		1935
6BK		1936
6BK6		1936
6BT		1936
BT 6-3		1935
BT 6-5		1935
6BT6		1936
BT 6-10		1935
C 6-2		1935
C 6-2	Supplement	1936
C 6-8		1936
C 6-12		1936
HF-6	RC-331A	1938
6K		1936
6K1		1936
6K2		1936
6K3		1937
6K10		1936
6M		1936
6M2		1936
6Q1	RC-441	1939
6Q4	RC-441A	1939
6Q4X	RC-442	1939
6Q7	RC-414A	1939
6Q8, 6QK8	RC-414B	1939
6QU	RC-414	1939
R-6		1931-32
6T		1936
T 6-1		1935
T 6-1	Supplement	1936
6T2		1936
6T5		1937
T 6-7		1936
T 6-9		1935
6T10		1936

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Model No.	Description or Chassis No.	Bound Volume
T 6-11		1936
Radiola VII		1923-28
Radiola VII-B		1923-28
7-1	Alhambra I (Victor)	1923-28
7-2	Alhambra II (Victor)	1923-28
7-3	(Victor)	1923-28
7-10	(Victor)	1923-28
7-11	(Victor)	1923-28
7-26	(Victor)	1923-28
7-30	(Victor)	1923-28
BC 7-9		1935
BT 7-8		1935
C 7-6		1935
C 7-14		1936
D 7-7		1935
7K		1936
7K1		1937
7Q4	RC-478A	1939
7Q4X	RC-502	1939
7QB	RC-496	1939
7QBK	RC-496	1939
7QK4	RC-478B	1939
R-7	Superette	1931-32
R-7A		1931-32
R-7 D. C.		1931-32
R-7 L. W.		1931-32
SK-7		1931-32
7T		1936
7T1		1937
T 7-5		1935
T 7-12		1936
7U		1936
7U2		1936
7X		1936
7X1		1936
Radiola Super VIII		1923-28
8BK		1936
8BK6		1936
8BT		1936
8BT6		1936
C 8-15		1935
C 8-17		1935
C 8-19		1936
C 8-20		1936
CV-8		1937
D 8-28		1936
G-8		1937
HF-8	RC-331	1938
HF-8A	RC-331	1938
8K		1936
8K1		1936
8K11		1936
8M	RC-318	1938
8M1	RC-320	1938
8M2	RC-320A	1938
8M3	RC-321	1938
8M4	RC-321A	1938
PSU-8A, B, C		1938
PSU-8E		1938
8Q1	RC-337	1938
8Q2	RC-443	1939
8Q4	RC-337A	1938
8QB	RC-336	1938
8QBK	RC-336	1938
8QU5C	RC-443B	1939
8QU5M	RC-443B	1939
R-8		1931-32
R-8 D. C.	220-volt	1931-32
8T		1936
8T2		1936
8T10		1936
8T11		1936
T 8-14		1935
T 8-16		1935
T 8-18		1936
U-8	RC-404A	1939
8U		1936
8U2		1936
VE-8-60	(Victor)	1923-28
Radiola IX		1923-28
9-1	Florenza (Victor)	1923-28
9-2	Borgia II (Victor)	1923-28
9-3	Borgia I (Victor)	1923-28
9-15	(Victor)	1923-28
9-16	(Victor)	1923-28
9-18	(Victor)	1923-28
9-25	(Victor)	1923-28
9-40	Borgia (Victor)	1923-28
9-54	(Victor)	1923-28
9-55	(Victor)	1923-28
9-56	(Victor)	1923-28
C 9-4		1935
C 9-4	Supplement	1936
C 9-6		1935
CRD-9 A. C.		1933
CRD-9 D. C.		1933
CV-9		1938
D 9-19		1935
D 9-19	Supplement	1936
9K		1936
9K1		1937
9K2		1936
9K3		1937
9K10		1936
9M1	RC-357	1938
9M2	RC-357A	1938
9Q1	RC-444	1939
9Q4	RC-478	1939
9QK	RC-444A	1939
R-9 D. C.		1931-32
9SX-1 to 9SX-8		1938
9T		1936
R-9	Same as R-7 except cabinet	1931-32

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Model No.	Description or Chassis No.	Bound Volume
R-9 D. C.	Same as R-7 D. C. except cabinet	1931-32
T 9-7		1936
T 9-8		1936
T 9-9		1935
T 9-10		1936
TRK-9		1938
TRK-9	50-60 cycle supplement	1939
9TX-1 to -5	RC-401	1938
9TX-21	RC-403	1939
9TX-22	RC-403	1939
9TX-23	RC-403A	1939
9TX-31	RC-405	1939
9TX-32	RC-405A	1939
9TX-33	RC-405B	1939
9TX-50	First Prod. RC-435	1939
9TX-50	Second Prod. RC-454	1939
9TX-50M	Second Prod. RC-454	1939
U-9	RC-482B, RC-482C	1939
9X to 9X4	RC-350	1938
9X6	RC-350A	1938
9X11 to 9X14	RC-350A	1938
9U		1936
9U2		1936
Radiola X		1923-28
10-35	(Victor)	1923-28
10-51	(Victor)	1923-28
10-69	(Victor)	1923-28
10-70	(Victor)	1923-28
10K		1936
10K1		1937
10K11		1936
O-10		1939
PLF-10		1939
PSU-10A, B, C		1938
PSU-10E		1938
10Q1	RC-337B	1938
R-10		1931-32
R-10 D. C.		1931-32
10T		1936
10T	Second Production	1937
T 10-1		1935
T 10-3		1935
10T11		1936
U-10	RC-418B	1939
C 11-1		1935
C 11-1	Supplement	1936
C 11-3		1936
D 11-2		1935
D 11-2	Supplement	1936
O-11		1937
11Q4	RC-335C	1938
11QK	RC-335C	1938
11QU	RC-335E	1938
R-11		1931-32
R-11	Supplement	1931-32
T 11-8		1935
T 11-8	Supplement	1936
12-1	Cromwell (Victor)	1923-28
12-2	Tuscany (Victor)	1923-28
12-15	(Victor)	1923-28
12-25	(Victor)	1923-28
O-12		1938
12Q4	RC-338	1938
12QK	RC-338	1938
12QU	RC-338A	1938
R-12		1931-32
TRK-12		1938
TRK-12	50-60 cycle supplement	1939
U-12	RC-425A	1939
C 13-2		1935
C 13-2	Supplement	1936
C 13-3		1936
13K		1936
O-14		1939
R-14	(Victor) (also Radiola 42)	1929-30
15-1	Hyperion (Victor)	1923-28
C 15-3		1935
C 15-3	Supplement	1936
C 15-4		1936
15K		1936
O-15		1937
15U		1936
R-15	(Victor) (also Radiola 48)	1929-30
O-16		1939
16	Radiola 16	1923-28
RE-16		1931-32
RE-16A		1931-32
R-17-M		1933
17	Radiola 17	1923-28
RE-17	(Victor)	1929-30
R-18-W		1933
18	Radiola 18	1923-28
18	Radiola 18 D. C.	1923-28
RE-18		1931-32
RE-18A		1931-32
TMV-18-D	Signal Generator	1934
O-19		1939
RE-19		1931-32
20	Radiola 20	1923-28
20	Radiola 20 (Battery Connections)	1923-28
RE-20		1931-32
U-20	RC-498	1939
VA-20		1938
R-21		1931-32
21	Radiola 21	1929-30
D 22-1		1935
D 22-1A		1936
OSC. 22		1939
R-22		1933
22	Radiola 22	1929-30
VA-22		1939
RO-23		1931-32

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Model No.	Description or Chassis No.	Bound Volume
24	Radiola 24 (Superheterodyne)	1923-28
24	Radiola 24 (Battery Connections)	1923-28
RK-24	Phono. Osc. (Stk. No. 9554)	1935
R-25 D. C.		1933
25	Radiola 25 A. C.	1923-28
25	Radiola 25	1923-28
25	Radiola 25 (Battery Connections)	1923-28
U-25	RC-386B	1939
26	Radiola 26	1923-28
26	Radiola 26 (Battery Connections)	1923-28
RAE-26		1931-32
U-26	RC-386B	1939
CE-27	R-32 Amp. and Speaker	1929-30
R-27		1933
R-27	Revised	1933
R-28		1933
R-28-BW		1933
R-28-BWC		1933
R-28-P		1933
28	Radiola 28 A. C.	1923-28
28	Radiola 28 (Battery Connections)	1923-28
CE-29		1931-32
M-30		1931-32
30	Radiola 30	1923-28
30A	Radiola 30-A	1923-28
30A	Radiola 30-A D. C.	1923-28
U-30	RC-335KR	1939
P-31		1931-32
M-32		1931-32
R-32	(Victor)	1929-30
32	Radiola 32	1923-28
32	Radiola 32 D. C.	1923-28
PT-33		1931-32
33	Radiola 33	1929-30
33	Radiola 33 D. C. 110-Volt	1929-30
33	Radiola 33 D. C. 220-Volt	1929-30
M-34		1933
R-34	R-35 Chassis and Amp., R-15 Speaker	1929-30
E-35	(Victor)	1923-28
R-35	(Victor)	1929-30
TMV-36-B	Universal Curve Recorder	1934
R-37		1933
R-37-P		1933
R-38		1933
R-38-P		1933
R-39	(Victor)	1929-30
BT-40	RC-408	1939
CV-40		1939
RE-40		1933
RE-40-P		1933
U-40	RC-498A	1939
40X30	RC-405C	1939
40X31	RC-405D	1939
40X-50 Series	RC-436	1939
40X-52	Second Prod. RC-453	1939
40X-55	Second Prod. RC-453	1939
BK-41	RC-449	1939
BT-41	RC-449	1939
41	Radiola 41	1923-28
41	Radiola 41 D. C.	1923-28
BK-42	RC-408C	1939
BT-42	RC-408A	1939
42	Radiola 42 (also Victor Radio R-14)	1929-30
U-42	RC-498B	1939
R-43		1931-32
U-43	RC-498E	1939
44	Radiola 44	1929-30
U-44	RC-486B	1939
45E	RC-435A	1939
RE-45	(Victor)	1929-30
U-45	RC-486C	1939
45X	RC-459L	1939
45X1	RC-457, RC-457A	1939
45X2	RC-457, RC-457A	1939
45X5, 45X6	RC-457D	1939
45X11, 12	RC-459, RC-459D	1939
45X13	RC-459A, RC-459E	1939
45X111, 112	RC-459J	1939
45X113	RC-459K	1939
46	Radiola 46	1929-30
46	Radiola 46 D. C. 110-Volt	1929-30
U-46	RC-501	1939
46X1, 2	RC-459B, RC-459F	1939
46X3	RC-459C, RC-459H	1939
46X11	RC-456	1939
46X12	RC-456	1939
46X13	RC-456A	1939
46X21	RC-461B	1939
46X23	RC-461A	1939
46X24	RC-461	1939
47	Radiola 47	1929-30
48	Radiola 48 (also Victor Radio R-15)	1929-30
K-50	RC-418A	1939
K-50	Second Prod. RC-497	1939
M-50	RC-357J	1939
O-50		1939
R-50		1931-32
U-50	RC-414C	1939
R-51-B		1933
51	Radiola 51 D. C.	1923-28
R-52	(Victor)	1929-30
TMV-52-E	Beat Frequency Oscillator	1934
R-53-B		1933
BP-55	RC-455	1939
R-55		1931-32
T-55	RC-418	1939
X-55	RC-473A	1939

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Model No.	Description or Chassis No.	Bound Volume
BP-56	RC-455	1939
T-56	RC-418	1939
RE-57	(Victor)	1929-30
RAE-59		1931-32
K-60	First Prod. RC-415	1939
K-60	Second Prod. Loop Ant. RC-415B	1939
M-60	RC-357K	1939
R-60		1939
60	Radiola 60	1929-30
T-60	RC-425	1939
X-60	RC-474D	1939
K-61	RC-498F	1939
62	Radiola 62	1929-30
K-62	RC-415B	1939
T-62	RC-425D	1939
T-63	RC-472F	1939
64	Radiola 64	1929-30
T-64	RC-416	1939
T-65	RC-416	1939
66	Radiola 66	1929-30
67M		1937
67M1		1937
67M2		1937
67M3		1937
67	Radiola 67	1929-30
RAE-68		1931-32
M-70	RC-394	1939
R-70		1931-32
R-71		1933
R-71-B		1933
R-72		1933
R-73		1933
R-73	Revised	1933
RE-73		1931-32
R-74		1931-32
R-75		1933
R-75	Revised	1933
RE-75	(Victor)	1929-30
TMV-75-B	Field Intensity Meter	1934
R-76		1931-32
R-77		1931-32
R-78		1933
RAE-79		1931-32
K-80	First Prod. RC-415A	1939
K-80	Second Prod. Loop Ant. RC-415C and 415D	1939
80	Radiola 80	1929-30
RE-80		1933
T-80	RC-416A	1939
K-81	RC-415C	1939
RE-81		1933
82	Radiola 82	1929-30
82	Radiola 82 (Remote Control)	1929-30
K-82	RC-415C	1939
84BT		1937
84BT6		1937
RAE-84		1933
85BK		1937
BP85	RC-455	1939
85BT		1937
85BT6		1937
85E		1937
85K		1937
85T		1937
85T1		1937
85T2		1937
85T5		1937
85T8		1937
86BK		1937
86BT		1937
86E		1937
86K		1937
86K7		1937
86	Radiola 86	1929-30
86	Radiola 86 (Remote Control)	1929-30
86T		1937
86T1		1937
86T2		1937
86T3		1937
86T4		1937
86T6	RC-315B	1938
86T44		1937
86X		1937
86X4		1937
87EY		1937
87K		1937
87K1		1937
87K2		1937
87T		1937
87T1		1937
87T2		1937
87X		1937
87Y		1937
88K		1937
88U		1937
88U2		1937
R-89		1938
R-90		1933
R-90-P		1933
TRK-90		1939
R-91		1938
R-91-B		1934
R-92		1934
R-93		1934
R-93		1935
R-93	Supplement	1937
R-93-2		1937
R-93-A		1937
R-93-B		1938
R-93-C		1938
R-93-F		1939
R-93-S		1937
94BK	RC-333	1938

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Model No.	Description or Chassis No.	Bound Volume
94BK1	RC-333B	1938
94BK2	RC-390	1938
94BP1 Series	RC-407, RC-407B	1939
94BP4 Series	RC-410	1938
94BT	RC-333	1938
94BT1	RC-333B	1938
94BT2	RC-390	1938
94BT6	RC-333A	1938
94BT61	RC-333C	1938
R-94		1937
R-94B		1938
94X	RC-332	1938
94X1	RC-340	1938
94X-2	RC-340	1938
R-95		1935
95T	RC-323	1938
95T1	RC-323	1938
95T5	RC-348	1938
95T5LW	RC-348F	1938
95X	RC-345D	1938
95X1	RC-345C	1938
95X6	RC-381A	1938
95X11	RC-381	1938
95XL	RC-345E	1938
95XLW	RC-345F	1938
96BK6	RC-392	1938
96BT6	RC-392	1938
96E	RC-348C	1938
96E2	RC-351L	1938
96K	RC-351	1938
96K2	RC-351B	1938
96K5	RC-351L	1938
96K6	RC-351L	1938
R-96		1937
96T	RC-348A	1938
96T1	RC-348D	1938
96T2	RC-351	1938
96T3	RC-351B	1938
96T4, T5	RC-399	1939
96T6	RC-399A	1939
96T7	RC-351L	1938
96X-1 to -4	RC-400	1939
96X-5	RC-490	1939
96X-11 to -14	RC-400A	1939
97E	RC-351A	1938
97K	RC-351F	1938
97K2	RC-351K	1938
97KG	RC-351A	1938
R-97		1937
97T	RC-351A	1938
97T2	RC-351K	1938
TMV-97-A	Battery Osc.	1933
TMV-97-B	Battery Osc.	1934
TMV-97-C	Batt. Osc. (Stk. No. 9595)	1935
97X	RC-349	1938
97Y	RC-352A	1938
98EY	RC-352	1938
98K	RC-335A	1938
98K2	RC-386A	1939
R-98		1939
98T	RC-386A	1939
98T2	RC-352D	1939
98X	RC-352	1938
98YG	RC-352	1938
99K	RC-335B	1938
R-99		1936
R-99	Second Prod.	1937
99T	RC-335H	1938
100	Loudspeaker	1923-28
100-A	Loudspeaker	1923-28
100		1933
100	Revised	1933
100-B	Loudspeaker	1929-30
R-100		1939
101		1933
101	Revised	1933
M-101		1935
U-101		1937
102		1934
U-102E		1937
103	Loudspeaker	1923-28
103		1935
U-103		1937
104	Loudspeaker	1923-28
M-104		1935
104	Radiola 104 D.C.	1923-28
U-104	RC-345H	1938
105	Loudspeaker	1923-28
K-105	RC-476	1939
M-105		1934
U-105		1937
106	Loudspeaker	1923-28
U-106	RC-319B	1938
M-107		1934
U-107		1937
M-108		1935
U-108		1937
M-109		1935
U-109		1937
110		1933
CV-110		1938
CV-110		1939
111		1933
ACR-111		1937
CV-111		1939
U-111	RC-341	1938
112		1933
112-A		1934
U-112	RC-341C	1938
114		1933
115		1933
U-115	RC-348E	1938
M-116		1934
117		1935

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Model No.	Description or Chassis No.	Bound Volume
118		1934
118	Supplement	1935
TMV-118-B	Reg. "B" Supply (Stk. No. 9650)	1935
119		1935
U-119	RC-351E	1938
120		1933
TRK-120		1939
121		1933
TMV-121-A	Output Ind. (Stk. No. 4317)	1934
U-121	RC-348J	1939
122		1933
TMV-122-B	3-inch CRO (Stk. No. 9545)	1935
TMV-122-C	3-inch CRO (Stk. No. 9640)	1936
TMV-122-D	3-inch CRO (Stk. No. 9641)	1936
U-122E	RC-351D	1938
UY-122E	RC-352B	1938
M-123		1934
U-123	RC-348H (one band)	1939
U-123	RC-421 (two bands)	1939
124		1934
U-124	RC-351C	1938
UY-124	RC-352C	1938
125		1935
U-125	RC-386	1938
126-B		1934
U-126	RC-335D	1938
127		1934
U-127E	RC-348L	1939
128		1934
128		1935
128-E		1935
TMV-128-A	Mech. Sweep (Stk. No. 9558)	1935
U-128	RC-335D	1938
U-129	RC-335K	1939
K-130	RC-501A	1939
U-130	RC-354	1938
TMV-131-A	Conv'sn Kit (Stk. No. 9559)	1935
TMV-132-A	Univ. AC Bridge (Stk. No. 9600)	1935
U-132	RC-331C	1938
TMV-133-A	Crystal Calib. (Stk. No. 9572)	1936
TMV-134-A	B-F Audio Osc. (Stk. No. 9633)	1936
U-134	RC-331B	1938
U-134A	RC-331B	1938
135-B		1934
ACR-136		1935
RP-139A		1939
140		1933
140	With Ext. I. F. Transformers	1934
140	Volume Control Replacement	1933
141		1933
141	With Ext. I. F. Transformers	1934
141-E		1933
141-E	With Ext. I. F. Transformers	1934
142-B		1933
143		1934
143		1935
RP-145		1939
Stock No. 150	Sweep Osc.	1936
Stock No. 150-A	Sweep Osc.	1936
Stock No. 151	1-inch CRO	1936
Stock No. 151-2	2-inch CRO	1938
Stock No. 151-A	1-inch CRO	1936
Stock No. 153	Test Osc.	1938
Stock No. 154	B-F Audio Osc.	1938
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RE-156	R-32 Speaker, Amp., and Chassis	1929-30
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Stock No. 159	Alignment Oscillator	1939
Stock No. 160	5-inch General Purpose CRO	1939
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Stock No. 162	Chanalyst	1939
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AP-1080	"B" Eliminator	1923-28
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Stock No. 7853	Universal Output Trans.	1937
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Stock No. 9545	3-inch CRO (TMV-122-B)	1935
Stock No. 9549	Pickup Magnetizer	1935
Stock No. 9554	Phono. Osc. (RK-24)	1935
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Stock No. 9595	Battery Osc. (TMV-97C)	1935
Stock No. 9600	Univ. AC Bridge (TMV-132-A)	1935
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[Revised January, 1936]

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Brand Models Without RCA Victor Equivalents

WR-8	Westinghouse WR-6 Chassis with Clock in Columnaire Cabinet.
WR-8-R	Westinghouse WR-6-R Chassis modified for Vertical operation in Columnaire Cabinet.
K-82	G. E. K-62 in Clock Cabinet.
J-88	G. E. J-82 with Manual Motor Board.
H-91	G. E. H-51 (Modified) in Clock Cabinet.
H-91-R	G. E. H-51-R (Modified) in Clock Cabinet.
J-109	G. E. J-100 Chassis and Automatic Motor Board.
JZ-826	G. E. JZ-822 in Console Cabinet.
JZ-828	G. E. J-88 with Short-Wave Adaptor.

NOTE: RCA Victor Models Without Brand Equivalents are not Listed

Special

Supplementary Data

for

Models in 1939 and Earlier Volumes

- *This information is based on actual service experience of RCA Field Engineers.*

- **It gives quick, definite, authoritative remedies for specific troubles that have occurred on these models.**

- *This special section also contains:*

  1—Changes and improvements in late production, after Service Notes were issued.

  2—Data on numerous models for which separate Service Notes will not be published.

  3—A continuation of the convenient "Replacement Parts Guide".

- *This special information is copyrighted and will not be republished elsewhere.*

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SUPPLEMENTARY DATA

(1) MODELS 4QB, 4QB4

Oscillation:

In some productions, a .25 mfd., 350-volt paper capacitor is connected across the electrolytic capacitor C20 to prevent oscillation.

Additional Replacement Parts:

Stock No.	
14393	Capacitor—.01 mfd. (C30).....
34459	Capacitor—.0025 mfd. (C18).....

(2) MODEL 5Q5

With Tone Control:

The 2nd production of Model 5Q5 uses chassis No. RC-477 and has a .5 meg. tone control.

The tone control is connected in place of the output-tube grid resistor (R9), with a .005 mfd. capacitor connected from the arm of the tone control to the 1st-audio plate.

For service data and replacement parts on RC-477, refer to the Service Data for the 1st-production Model 5Q5 (RC-396), and the following parts:

Stock No.	
34146	Control—Tone control, .5 meg.....
4838	Capacitor—.005 mfd.....

(3) MODEL 5Q8

With Tone Control:

The 2nd production of Model 5Q8 uses chassis No. RC-477B and has a .25 meg. tone control.

The tone control is connected in place of the output-tube grid resistor (R9), with a .005 mfd. capacitor connected from the arm of the tone control to the 1st-audio plate.

For service data and replacement parts on RC-477B, refer to the Service Data for the 1st-production 5Q8 (RC-396B), and the following parts:

Stock No.	
34224	Control—Tone control, 250,000 ohms
4838	Capacitor—.005 mfd.....

Ballast Resistor:

In Model 5Q8 Service Data, change Stock No. 32544 to MI-8115 (135K1A). No. 32544 (BK-49B) may be used if terminals 3 and 4 are connected by a jumper.

(4) MODEL 5X5

Additional Replacement Parts:

Stock No.	
32946	Drum—Condenser drive drum and indicator .....
11765	Lamp—Dial lamp, Mazda No. 51..
33324	Switch—"Remote" switch.....
32967	Transformer—Second I-F trans.....
34569	Speaker—Complete—less transformer

(5) MODEL RR-5 RECORD RACK

Re-gluing Rubber Pads:

A tendency has been noted on some of the earlier production record racks, for the two layers of sponge rubber used as pads for supporting the records, to separate from each other or from the metal base. In order to effect satisfactory and lasting repairs in such cases, the procedure listed below should be carefully followed:

(a) Remove entire pad from metal base and separate two layers of rubber. If the rubber sticks in spots, it may be loosened by the application of "Toluene" or any other Goodrich "Plasticon" solvent.

(b) Wash the metal base and sponge rubber strip thoroughly with "Toluene" or other "Plasticon" solvent, making sure that all foreign matter has been removed.

(c) Apply Goodrich "Plasticon" cement to the top surface of the metal base, both faces of the first layer of sponge rubber and to the bottom surface of the top sponge rubber layer.

(d) Carefully assemble strips and press firmly together and against metal base.

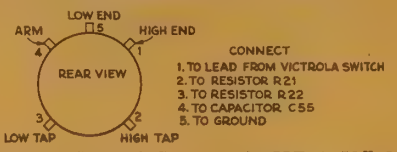
(e) Allow to dry.

The positioning is very important both from the standpoint of appearance and for preventing record breakage.

(6) MODELS HF-6, HF-8, U-132, U-134

Volume Control Connections:

The circuit shown in the Service Data is incorrect and should be as shown below:



Volume Control Contacts in HF-6, HF-8, U-132, U-134.

(7) MODELS 6Q1, 6Q4

Additional Replacement Parts:

Stock No.	
34662	Cord—Condenser drive cord.....
11761	Lamp—Mazda No. 51.....
35441	Cone—Cone complete with voice coil, suspension, and dust cap.....
34571	Knob—Range switch knob (brown).
34570	Knob—Tone control knob (brown).
34136	Knob—Tuning or volume control (brown) .....
34984	Knob—Range switch knob (black)..
34983	Knob—Tone control knob (black)..
34982	Knob—Tuning or volume control (black) .....
34296	Dial—Marked in kc (6Q4).....

(8) MODELS 6Q7, 6Q8

Additional Replacement Part:

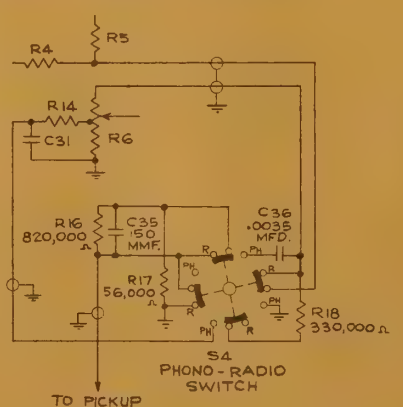
Stock No.	
35441	Cone—Speaker cone and voice coil..

(9) MODEL 6QK8, RC-414B

Technical Information and Service Data:

Refer to Service Data on Model 6Q8 and the following parts:

Stock No.	
	SPEAKER ASSEMBLY, 6QK8 (RL-70J-6)
31825	Cap—Cone center dust cap.....
11234	Coil—Speaker field coil.....
31275	Cone—Speaker cone and voice coil..
5118	Plug—3-prong male plug for speaker.
14355	Transformer—Output transformer...
	MISCELLANEOUS ASSEMBLIES
35043	Dial—Glass dial scale, 6QK8.....



Radio-Phono Switching Circuit Used in 2nd-Production of Model 6QU.

(10) MODEL 6QU

2nd Production:

The radio-phono switching circuit is changed as shown in the accompanying diagram. Also, R13 and C22 are removed from the output plate circuit, and C30 (.005 mfd.) is connected from plate to cathode on the output tube.

The following parts are used in the revised circuit:

Stock No.	
12725	Capacitor—150 mmfd. (C35).....
30303	Capacitor—.0035 mfd. (C36).....
30963	Resistor—820,000 ohms, ½-watt (R16)
12286	Resistor—56,000 ohms, ½-watt (R17)
14983	Resistor—330,000 ohms, ½-watt (R18)
32743	Switch—Radio-phono switch.....

Additional Replacement Parts:

Stock No.	
35441	Cone—Speaker cone and voice coil..
32953	Frame—Dial frame and holder, comprising dial color plate, holder, mounting, brackets, "Magic Eye" cap, indicator, and carriage.....

(11) MODELS 7Q4, 7QK4

Additional Replacement Part:

Stock No.	
35194	Dial—Marked in kc.....

(12) PSU-8E AND PSU-10E

Recommended Changes:

(a) Replace paper condensers, Stock No. 32049 (C-11 and C-12) on the earlier models with a new type oil capacitor now carried under the same stock number and incorporated in units of later production.

(b) The transformer primary leads should be reversed so that the black with red tracer lead goes through R-3 to terminal No. 1 on the vibrator socket and the yellow lead through R-4 to terminal No. 6 of the vibrator socket.

(c) An insulative sheet is to be added to the bottom cover under the 4,700 ohm (R-2) resistor.

(d) Precaution should be taken to dress parts and leads to clear chassis and bottom cover.

(e) Three ampere fuses are now being recommended for 220-volt operation. They are carried as Stock No. 10907.

(13) MODELS 8M, 9M1, 9M2, M-50, AND M-60

Loudspeaker Cones:

Speaker marked 84391-1 is used in 9M1, 9M2, M50 and M60. The correct cone for this speaker is **Stock No. 35913.** This cone has a "buttercup" type of spider.

Speaker marked 84147-2 is used in 8M, but has two types of cones, which vary as to mounting dimension of the spider suspension:

Stock No. 35464 cone fits speaker marked 84147-2 with a 2⅜ inch dimension between suspension points.

Stock No. 30782 cone fits speaker marked 84147-2 with a 2-9/16 inch dimension between suspension points.

(14) MODEL 8QU5C

Phono Compensation Change:

In some production, the phono compensation capacitor C51 is changed from .015 mfd. to .035 mfd. (Stock No. 5196), and is shunted with an 82,000 ohm resistor (Stock No. 14023).

Additional Replacement Part:

Stock No.	
30870	Plug—2-prong male plug for motor leads (8QU5-C and -M).....

(15) MODEL U-8

Additional Replacement Parts:

Stock No.	
34758	Bushing—1 rubber, and 1 metal, for pickup arm
34374	Cone—Speaker cone and voice coil

(16) MODELS 9M1, 9M2

Additional Replacement Part:

Stock No.	
34053	Spring—Push-button retaining spring

(16A) MODELS 9M1, 9M2, M-50, M-60, M-70, 96X-11, -12, -13, -14

Push-Arm Inserts:

Special push-arm inserts are now available to take care of stripped threads on the push button mechanism in these models.

Stock No. 36160 Insert is for use in Models 9M1, 9M2, 96X-11, -12, -13, -14.

Stock No. 36161 Insert is for use in Models M-50, M-60, and M-70.

(17) MODELS 9TX-21, -22, -23

Additional Replacement Part:

Stock No.	
31646	Spring—Dial knob spring

(18) MODELS 9TX-31, -32, -33

Circuit Revisions:

The following circuit modification is suggested on Model 9TX30 series receivers where repeated failure of the No. 32970 line resistor and No. 31480 pilot lamp has occurred:

MATERIAL REQUIRED:

Quantity	Part	RCA Stock No.
1	Rectifier tube	35Z5GT
1	Resistor	33558
1	No. 51 Mazda pilot lamp	11765

PROCEDURE:

(a) Remove all connections from terminals No. 2 and No. 4 of terminal board and terminals No. 2, No. 5, and No. 6 of 35Z4GT socket.
(b) Resolder pilot lamp lead, removed from terminal No. 4 of terminal board, and power lead removed from terminal No. 6 of rectifier socket, to terminal No. 2 of rectifier socket.
(c) Resolder pilot lamp lead, removed from terminal No. 6 of rectifier socket, to terminal No. 3 of rectifier socket. Add jumper between No. 5 and No. 3 of rectifier socket.
(d) Resolder .05 mfd. capacitor, removed from terminal No. 6 of rectifier socket, to terminal No. 5 of rectifier socket.
(e) Replace jumper between terminal No. 7 of rectifier socket and terminal No. 2 of 35L6GT socket, with 86 ohm resistor (Stock No. 33558).
(f) Replace 35Z4GT rectifier tube with a 35Z5GT rectifier tube.
(g) Replace No. 47 Mazda pilot lamp with a No. 51 Mazda pilot lamp (Stock No. 11765).

Additional Replacement Parts:

Stock No.	
33139	Rubber grommet for tuning shaft
34174	Output transformer for speaker marked 39105-4
31646	Spring—Dial knob spring
33291	Volume control and switch for 9TX-33

(19) MODELS 9TX-50, 9TX-50M

Additional Replacement Part:

(For 1st Production, RC-435.)

Stock No.	
34569	Speaker—Complete—less transformer

(20) MODELS 9TX-50, 9TX-50M

2nd Production, RC-454:

Add Stock No.	
35613	Back—Back cover and loop complete.

(21) MODELS 9Q1, 9QK

Additional Replacement Parts:

Stock No.	
34648	Coil—Antenna coil, 25, 19, 16, 13 meters
34649	Coil—Antenna coil, "A" band
34647	Coil—Antenna coil, "B" and 31 meters
34652	Coil—RF coil, "A" band
34651	Coil—RF coil, 25, 19, 16, 13 meters
34650	Coil—RF coil, "B" and 31 meters

(22) MODEL 9Q4

Additional Replacement Parts:

Stock No.	
34662	Cord—Pointer drive cord
35194	Dial—Marked in kc

(23) MODEL U-9

2nd Production, RC-482C:

Add Stock No.	
35685	Speaker (RL-81A-3)

(24) MODELS U-9, U-10, U-12, U-20

Turntable Wobble:

Turntables (Stock No. 33899) found to have excessive wobble (vertical run-out) may be trued-up in the following manner:

(a) Obtain a motor bearing, Stock No. 31046 (used in R93-B) and clamp same securely in a vise.
(b) Place turntable spindle in this bearing and make sure that turntable spins freely.
(c) With turntable spinning, the high side can readily be determined by use of a piece of chalk carefully lowered so that it just touches the high spot of the turntable, leaving a mark.
(d) With both hands grasp the rim of the turntable, thumbs on top and index fingers underneath turntable at the center of the chalk mark.
(e) Apply a moderate amount of pressure in a downward direction at right angle to the jaws of the vise.
(f) Spin turntable again and if still running out, repeat operation mentioned under (c), continuing by trial until turntable runs true.

(25) MODELS O-10 AND O-19

Additional Replacement Parts:

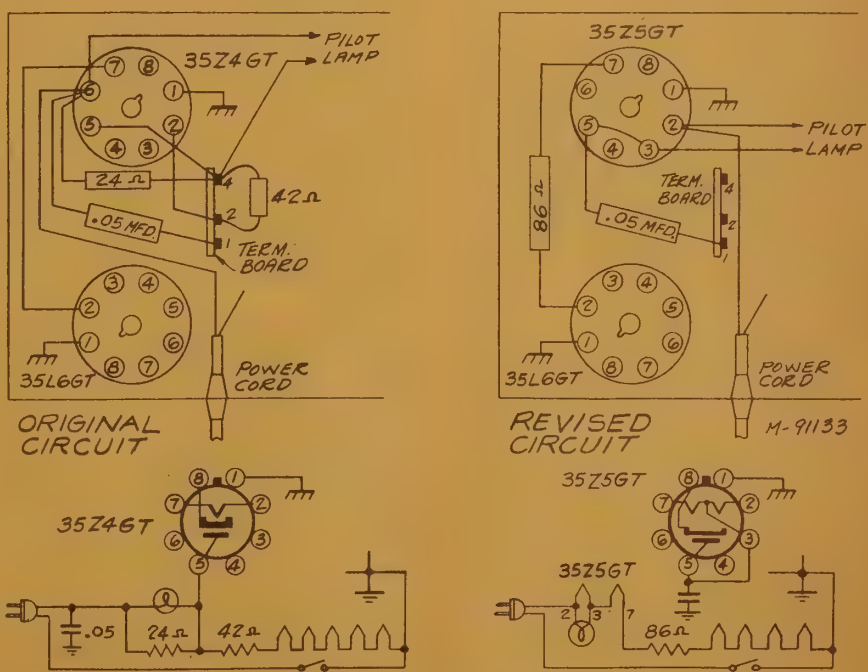
Stock No.	
X840	Grille—Grille cloth
35484	Lever—Speed indicator lever for angle-wind motor
33679	Lever—Speed indicator lever for side-wind motor
34388	Spring—Winding shaft spring for side-wind motor

Under "Angle-Wind" Motor add:	
11533	Ball—Steel ball
35303	Motor—Motor complete
36483	Spring shaft and rivet

Angle-Wind Motor:

Where unsatisfactory performance, due to "WOW" or excessive motor noise is experienced, these conditions may be remedied in the following manner:

(a) Replace rubber drive sleeve and associated washer with revised type rubber sleeve and revised metal washer, Stock No. 33700, making sure to force the sleeve all the way down against the thin metal washer, and snugly into turntable hub. A small quantity of soap applied to the spindle and turntable will facilitate this operation. The revised rubber sleeve is of relatively hard rubber and is accurately machined. The washer has been made thinner to allow a tight fit between spindle nose and rubber sleeve.
(b) Check turntable for wobble and if excessive, correct by simply pressing down on edge of turntable which runs high. **TEST INSTRUMENT—THEN, IF NECESSARY,** apply the following changes in order given until acceptable performance is obtained.
(c) Replace governor assembly with improved type, Stock No. 33701, and governor bearings with new type, Stock No. 33698.
(d) Replace spindle and fibre gear assembly with later manufactured part, Stock No. 33703.



Model 9TX-31, -32, -33.

WOW is generally contributed by mechanical variations of the turntable, governor, and spindle assembly.

NOISE is contributed mainly by the high speed parts. It is particularly dependent on accuracy and uniformity of gear mesh with the spindle assembly.

SPEED CONTROL RATIO may be increased (if desired) by carefully bending felt friction pad support nearer to axis of control lever stud, being careful to clear the governor springs and screws.

Increasing Speed Control Ratio on Angle-Wind Motors in O-10 and O-19.

(26) MODEL U-10

Additional Replacement Parts:

Stock No.

34758 Bushing—1 rubber and 1 metal, for pickup arm
32610 Rest—Rubber rest for pickup
33735 Screw—Push-button lock screw
30585 Spring—Drive cord spring

Under "Motor Assemblies" add:

32654 Ball—For turntable bearing

2nd Production:

The following revisions were made in the 2nd production of Model U-10:

(a) C8 changed from .05 mfd. to .01 mfd. (Stock No. 4937).
(b) C22 changed from .0035 mfd. to .0015 mfd. (Stock No. 33806).
(c) R11 changed from 56,000 ohms to 150,000 ohms (Stock No. 13698).
(d) R3 changed from 2.2 megs. to 5.6 megs. (Stock No. 11668).
(e) R4 (volume control) changed from 1 meg. to 2 megs., tapped at 500,000 ohms (Stock No. 34796).
(f) R12, 820,000 ohms (Stock No. 30963), added from bottom end of R10 to chassis.
(g) C23, .005 mfd. (Stock No. 33584), added between R10 and contact 5 on S1.
(h) Contact 5 on S1 connected to contact 3 on S2.
(i) DP2 on 6SQ7 was connected to left-hand end of R3. This connection is removed and DP2 is grounded.

(27) MODEL U-12

Additional Replacement Parts:

Stock No.

32654 Ball—Ball for turntable bearing
35441 Cone—Speaker cone complete with voice coil, center suspension, and rim gaskets
33974 Screw—Pickup needle screw
30585 Spring—Indicator drive cord spring.

2nd Production:

The following revisions were made in the 2nd production of Model U-12:

(a) C7 changed from .05 mfd. to .01 mfd. (Stock No. 4937).
(b) C5 changed from .05 mfd. to .025 mfd. (Stock No. 4870).
(c) R8 changed from 6,800 ohms to 15,000 ohms (Stock No. 12695).
(d) R3 changed from 2.2 megs. to 5.6 megs. (Stock No. 11668).
(e) R16 changed from 270,000 ohms to 560,000 ohms (Stock No. 12486).
(f) R4 (volume control) changed from 1 meg. to 2 megs., tapped at 500,000 ohms (Stock No. 34796).
(g) R18, 56,000 ohms (Stock No. 12286), added from Victrola jack to chassis.
(h) R17, 820,000 ohms (Stock No. 30963), added from bottom end of R9 to chassis.
(i) C30, .005 mfd. (Stock No. 33584), added between R9 and contact 5 on S2.
(j) C27 (from Victrola jack) is omitted.
(k) Contact 5 on S2 is connected to contact 3 on S3.
(l) DP2 on 6SQ7 was connected to left-hand end of R3. This connection is removed, and DP2 is grounded.

(28) MODEL O-16

Additional Replacement Part:

Stock No.

35975 Support—Lid support

(29) MODEL U-20

Compensation Change:

In some production, R16 is changed from 8,200 ohms to 3,900 ohms (Stock No. 12955).

Additional Replacement Parts:

Stock No.

11765 Lamp—Dial lamp
11763 Receptacle—Needle card holder
35595 Resistor—15,000 ohms, 3 watts (R2)
30585 Spring—Drive cord spring
34723 Socket—3-contact socket for loop
34261 Transformer — Power transformer, 105-120 volts, 50-60 cycles

Add the following for 50 cycle, 105-125 volt motor for Model U-20:

Same as used for 105-125 volt, 60 cycle motor, except less 34514 cover, 34516 motor cover, and 34412 armature, and add:

35605 Armature — Complete for 105-125 volt, 50 cycle motor
35604 Motor—105-125 volt, 50 cycle phono motor, less pulleys, capacitor, and motor cradle

(30) MODEL VA-20

Changing Frequency Range:

Should it be desirable to employ a different range of frequency on the VA-20 Wireless Record Player, this may be accomplished readily by removing turns from the oscillator coil.

The resultant frequency range for given number of removed turns are:

Turns Removed	Frequency Range
8	580 kc - 710 kc
16	630 kc - 770 kc
24	700 kc - 850 kc
32	760 kc - 940 kc
40	850 kc - 1,050 kc
48	960 kc - 1,200 kc
56	1,100 kc - 1,400 kc
64	1,300 kc - 1,650 kc

Motor Inter-Lock Switch:

An interlock switch has been added to motor base on these models, and is connected in series with the motor supply. This switch "opens" whenever the turntable is removed, and obviates tube damage. Replacement parts as listed in Service Notes apply except as noted below:

Omit Stock No.

31046 Bearing Assembly

Add Stock No.

35003 Ball—Steel ball for rotor bearing
35002 Bearing—Rotor bearing assembly—less ball
35004 Plunger—Hard rubber plunger for motor switch
35001 Switch—Motor switch complete

Note:

Stock No. 32507 base will include two (2) holes for mounting of switch (Stock No. 35001) and may be used as replacement for early or late models.

Rotor Lamination Identification:

The inner diameter of the rotor laminations is not the same as that of Models R-93B, R-93C, U-111, etc., and therefore can not be interchanged, or centered with the same gauges. The VA-20 and R-89 rotors have a "green" dot as a means of identification.

(31) MODEL OSC-22

Circuit Change:

The low end of the volume control and resistor R5 and capacitor C11 are connected to the common negative line (not to the chassis).

C11 is changed from .2 mfd. to .1 mfd. (Stock No. 4839) in some production.

(32) MODEL VA-22

2nd Production:

The 2nd production of Model VA-22 uses mechanism similar to RP-139A and RP-145.

For replacement parts, refer to the Service Data on RP-139A and RP-145 as specified below:

Stock No.

PICKUP AND ARM ASSEMBLIES

Same as RP-145, except add:
33905 Crystal—Pickup crystal cartridge and needle screw for 25-cycle only

OPERATING MECHANISM, MOTOR ASSEMBLIES, MOTORBOARD ASSEMBLIES

For 110-volt, 60-cycles, same as RP-145.
For 110-volt, 25-cycles, same as RP-139A.

MISCELLANEOUS ASSEMBLIES

31108 Control—Volume control and power switch
12673 Knob—Volume control knob
31564 Receptacle—Needle card receptacle
4119 Screw—No. 8-32 headless set screw for knob, Stock No. 12673
31470 Springs — Motorboard mounting springs, screw and washer (4 required)

(33) MODELS 40X-30, 40X-31, 40X-50

Additional Replacement Part:

Stock No.

11315 Capacitor—.015 mfd. (output tube plate by-pass in some production of Model 40X-50)
11765 Lamp—Dial lamp
34569 Speaker—Complete—less transformer

(33A) MODELS 40X-30, 40X-31

Burnt-Out I-F Transformer:

A few cases have been reported in Models 40X-30, -31 where the secondary of the 1st I-F transformer has burned out. Investigation showed that this was caused by a combination of two things:

(a) The low ends of the primary and secondary of the loop antenna were reversed, so that the low-end of the primary was connected to the AVC bus.
(b) A grounded antenna lead was connected to the antenna terminal on the back of the receiver.

This placed 110 volts on the grid of the I-F tube, drawing sufficient current to burn out the secondary of the 1st I-F transformer, and also the I-F bias resistor.

The remedy is to re-wire the loop antenna correctly as shown in the Service Data. The low-end of the primary should be connected through the .1 mfd. capacitor to chassis, and the low-end of the secondary should be connected to the AVC bus.

(34) MODELS 40X-52, 40X-55

2nd Production, RC-453:

Add Stock No.

35612 Back—Back cover and loop complete.

(35) MODELS BT-40, 94BP1

Off-Center Cone:

In many cases, an off-center original cone may be quickly centered by bending the support webs of the speaker housing in the required direction.

(36) MODEL U-40

Compensation Change:

In some production of Model U-40, R16 is changed from 8,200 ohms to 3,900 ohms (Stock No. 12955).

Additional Replacement Parts:

Stock No.

11765	Lamp—Dial lamp.....
33973	Markers—Station markers.....
11763	Receptacle—Needle card holder.....
35595	Resistor—15,000 ohms, 3 watts (R2)
34723	Socket—3-contact socket for loop...
30585	Spring—Drive cord spring.....
31478	Support—Lid support.....
34261	Transformer—Power transformer, 105-120 volts, 50-60 cycles.....
31445	Transformer—Power transformer, 105-120 volts, 25 cycles.....

(37) MODEL BK-42, RC-408C

Technical Information and Service Data:

Refer to Service Data on Model BT-42 and the following parts:

Stock No.

12635	Capacitor—1,000 mmfd. (C16).....

SPEAKER ASSEMBLY, BK-42 (84649-2) 6-in. P. M.

34507	Cone—Speaker cone and voice coil..
34508	Transformer—Output transformer...

In some production, the oscillator grid resistor R1 is changed from 220,000 ohms to 150,000 ohms (Stock No. 14020).

Model BK-42 (RC-408C).

(38) MODEL BT-42

Replacement Loudspeaker Cones:

Three types of loudspeakers have been employed in Model BT-42. Replacement cones are identified and available as follows:

Speaker Marking	Cone Stock No.
84650-1	33458
84650-2	35483
84650-5	35127

The speaker marked 84650-5 uses output transformer Stock No. 35128.

Oscillator Grid Resistor:

In some production, the oscillator grid resistor (R1) is changed from 220,000 ohms to 150,000 ohms (Stock No. 14020).

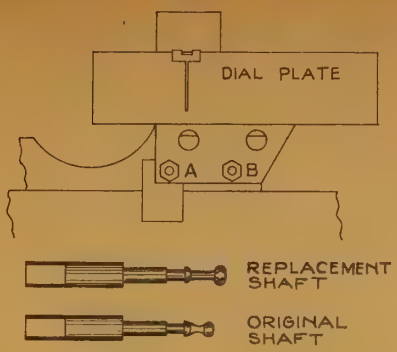
Dial Drive Slippage, or Cord Breakage:

In cases where abnormal slippage or breakage of the dial cord is experienced, the following corrective measures are suggested:

SLIPPAGE: Slippage may be due to one or more of the following conditions:

(a) Chassis mounted too far into cabinet causing dial pointer to rub against cabinet.
(b) A bent cord drum touching chassis.
(c) Dial cord rubbing against parts in chassis.
(d) Tuning condenser bearing too stiff.

BREAKAGE: Breakage of dial cord may be caused by any one of the following or a combination thereof:



Tuning Shaft, Model BT-42.

(a) The machined surface at the drive pulley being rough.
(b) Surface of guide rivets being rough.
(c) Dial cord rubbing against head of guide pin rivets due to poor alignment between rivets and dial cord drum.
(d) Guide pin rivets should be flush with mounting plate and tightly riveted at right angle to the plate, so as to avoid the possibility of a crack between rivet shoulder and dial plate, permitting dial cord to enter and resulting in a premature failure of cord.

A revised replacement shaft Stock No. 34124 is available for correcting slippage. This shaft should be installed and adjustments made to the dial drive assembly, as follows:

(a) Take off knobs and remove chassis from cabinet.
(b) Remove dial assembly from chassis by taking off nuts A and B.
(c) Pull out tuning shaft after first removing the slotted spring washer used for holding tuning shaft in place.
(d) Insert replacement shaft and lock in place with spring washer after first having applied a drop of oil to the shaft bearing.
(e) Install new dial cord, placing 3½ turns around the tuning shaft pulley.
(f) Fasten dial assembly to chassis with nuts A and B previously removed, taking care to see that dial drum is pushed back on the gang condenser shaft.
(g) With gang condenser fully out of mesh, adjust dial indicator to point to the extreme right mark on dial scale.

(38A) MODELS BK-42, BT-42

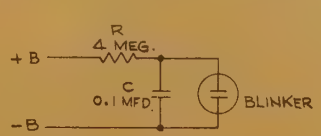
Economy Blinker:

The polarity of the blinker lamp is important to obtain the correct appearance. The outer "ring" is the positive terminal and a "plus" sign is stamped on the glass bulb to identify the lead from the outer ring.

The current consumption of the blinker lamp circuit is only a few microamperes.

The frequency, or number of flashes per second is determined by the time constant of the RC circuit in which the lamp is connected. In these models, R is approximately 4 megohms, and C is .1 mfd. The time constant is .4 second, corresponding to 2½ flashes per second.

The action is briefly as follows: When the battery switch is turned on, 90 volts "B" is applied through R to charge C. When the charge across C reaches about 70 volts, the lamp lights and discharges C, causing the lamp to be extinguished, and C again starts to charge up, repeating the cycle.



Blinker Lamp Circuit

(39) MODEL U-42

Compensation Change:

In some production, R16 is changed from 5,600 ohms to 2,700 ohms (Stock No. 14024).

Additional Replacement Parts:

Stock No.

11765	Lamp—Dial lamp.....
11763	Receptacle—Needle card holder.....
35595	Resistor—15,000 ohms, 3 watts (R2)
34723	Socket—3-contact socket for loop...
30585	Spring—Drive cord spring.....
31445	Transformer—Power transformer, 105-125 volts, 25 cycles.....

(40) MODEL U-43

Capacitor Added:

In Model U-43, a 0.1 mfd. capacitor (Stock No. 4839) is added in shunt to electrolytic capacitor C23.

Add Stock No.

35595	Resistor—15,000 ohms, 3 watts (R2)

(41) MODEL U-44

Compensation Change:

In some production of Model U-44, R24 is changed from 8,200 ohms to 5,600 ohms (Stock No. 13714).

Additional Replacement Parts:

Stock No.

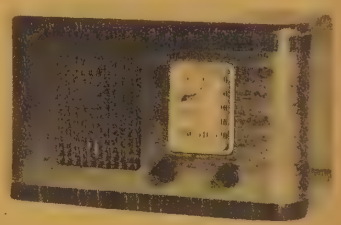
33551	Frame—Dial frame complete with shaft supports, lamp bracket, pointer rod, pointer, less dial.....
35942	Rubber lining for phono compartment lid .....
34693	Transformer—Power transformer, 25 cycles, 110 volts.....

(42) MODEL 45E

Additional Replacement Part:

Stock No.

33139	Rubber grommet for dial shaft.....



Model 45X (RC-459L).

(43) MODEL 45X, RC-459L

Technical Information and Service Data:

Model 45X (RC-459L) is similar to 2nd production Model 45X-13 (RC-459E), except for the following replacement parts used in Model 45X:

Stock No.

35072	Back—Cabinet back.....
35912	Dial—Dial scale, 45X.....
35067	Escutcheon—Dial scale escutcheon and crystal.....
30863	Knob—Walnut tuning or volume control knob.....
30900	Spring—Retaining spring for knob, Stock No. 30863.....
11909	Spring—Spring and fibre washer to take up play on drive shaft.....

Service Data for the 2nd production Models 45X-11, -12, -13 (RC-459D and RC-459E) applies to Model 45X.

(44) MODELS 45X-1, 45X-2 (RC-457)

Additional Replacement Parts:

Stock No.

12454 Resistor—33,000 ohms, ½ watt (R9)
31251 Socket—Tube socket.....
11909 Spring—Spring and fibre washer to take up play in drive shaft.....

(45) MODELS 45X-5, 45X-6

Additional Replacement Parts:

Stock No.

35337 Coil—Oscillator coil.....
11909 Spring—Spring and fibre washer to take up play in drive shaft.....

(46) MODELS 45X-11, -12, -13

Additional Replacement Parts:

Stock No.

33317 Fastener—Push fastener for cabinet back (45X-11, 45X-12).....
35993 Plate—Dial scale mounting plate...
11909 Spring—Spring and fibre washer to take up play in drive shaft.....

(46A) MODELS 45X-11, -12, -13, 46X-1, -2, -3

Microphonic Howl:

Vibration of parts in the oscillator circuit may cause microphonic howl, which can be corrected by the following:

(a) See that the drive pulley does not touch the dial.
(b) Squeeze in the rear of the gang condenser frame, in order to center the rotor plates within the stator.
(c) Loosen the tuning condenser mounting screws slightly to ensure free floating of the gang.

(47) MODELS 45X-111, -112, -113

Additional Replacement Parts:

Stock No.

35993 Plate—Dial scale mounting plate...
11909 Spring—Spring and fibre washer to take up play in drive shaft.....

(48) MODELS 46X-1, -2, -3

Additional Replacement Parts:

Stock No.

35993 Plate—Dial scale mounting plate...
11909 Spring—Spring and fibre washer to take up play in drive shaft.....

R13 is 150 ohms (Stock No. 13428) in some production.

(49) MODELS 46X-11, -12, -13

Antenna Circuit Change:

In some production of these models, capacitor C1 (68 mmfd.) is removed, and a through connection is made from terminal No. 3 on the antenna terminal board to terminal No. 2 on the loop.

Additional Replacement Part:

Stock No.

33724 Coil—Oscillator coil ("A" band)...

(50) MODELS 46X-21, -23, -24

Additional Replacement Parts:

Stock No.

12722 Capacitor—18 mmfd. (C44 for 46X-21, -23).....
12896 Capacitor—15 mmfd. (C44 for 46X-24).....
14393 Capacitor—.01 mfd. (C1).....
35338 Capacitor—.015 mfd. (C24 for 46X-23, -24).....
30938 Capacitor—.025 mfd. (C24 for 46X-21).....

(51) MODEL U-46

Low-Frequency Response:

Some instruments have tone compensation which provides the conventional amount of low-frequency response. Later production, however, has a revised circuit which predominates response below 100 cycles on one position of the "bass" or low-tone control. Should it be desirable to obtain this type of response on earlier instruments, the following changes are necessary:

(a) Replace the 82,000 ohm resistor (R11) with one of 56,000 ohms (Stock No. 12286).
(b) Replace the .035 mfd. capacitor (C33) with one of .01 mfd. (Stock No. 4937).
(c) Replace the .05 mfd. capacitor (C51) with one of .025 mfd. (Stock No. 4870).

Add Stock No.

4585 Hinge—Top and bottom hinges for top doors on some cabinets (hinge leaf bent 90°).

(52) MODELS K-50, T-55

Additional Replacement Parts:

Stock No.

30585 Spring—Drive cord spring.....
33735 Screw—Push-button lock screw ....

(53) MODELS O-50 AND U-50

Increasing Victrola Gain:

The over-all amplification of these models, when used as Victrolas, is limited by the voltage divider circuit comprised of a resistor in series with, and a capacitor across the pickup circuit. Values of these components are established on the basis of:

(a) Average available voltage output from pickup under average climatic conditions.
(b) Degree of "rumble" likely with given amplification.
(c) Danger of "microphonic howl" with high amplification.
(d) Possible consumer reaction to overload occurring at a low volume control setting with heavily cut records.

If these points are kept in mind, additional gain may be obtained, wherever desired, by decreasing the value of the pickup shunt capacitor; C-1 in Model O-50 and C-32 in Model U-50. The substitute capacitor should be approximately ¼ to ½ the value of the original.

Add Stock No.

34254 Indicator—Dial scale pointer and carriage (Model U-50).....

(54) MODELS BP-55, -56, -85

Resistance Power Cord:

In Models BP-55, -56, -85 that use a 35Z5GT rectifier, the 545-ohm resistance power cord is Stock No. 35311.

Distortion or Low Volume:

Distortion or low output on these models may be related to premature loss of emission of the 1T5GT output tube. This condition develops when the receiver is used on an AC or DC power supply, particularly where the line voltage is comparatively low. The 1T5GT now incorporates an over-sized filament that eliminates the trouble.

Chassis and Speaker Mounting:

Add Stock No.

35297 Mounting—Chassis and speaker mounting screw and cap.....

Hum:

Hum in Models BP-55, -56, -85 is generally due to an intermittent or open common connection between the electrolytic and chassis. Solder securely or add a jumper from the electrolytic ground lug to lance on chassis.

(55) MODEL T-55-S (Silver)

Technical Information and Service Data:

Model T-55-S is similar to Model T-55, except for the following parts used in T-55-S:

Stock No.

35180 Button—Push button.....
35181 Escutcheon—Dial escutcheon.....
35179 Knob—Tuning or volume control knob

Model T-56 (RC-418).

(56) MODEL T-56, RC-418

Technical Information and Service Data:

Model T-56 has the same chassis as T-55. **For Service Data and replacement parts, refer to Model T-55, and these additional parts used in T-56:**

Stock No.

X-834 Baffle—Baffle board and grille cloth.
35393 Decalcomania—"Television" .....
35392 Decalcomania—"RCA Victor".....

(57) MODEL K-60

Additional Replacement Parts:

(In RC-415.)

Stock No.

35014 Mounting—Rubber cushion, spacer and washers for chassis mounting (4 required).....
14439 Resistor—100 ohms, ½ watt (R12)..
34969 Washer—For under control knobs...

(58) MODELS K-60, K-80

Additional Replacement Parts:

(In RC-415B, 415C, and 415D.)

Stock No.

36078 Drive—Tuning knob drive assembly.
33436 Frame—Dial scale holder, mounting brackets, and pointer, assembled, less dial (RC-415B and 415D)...
33435 Frame—Dial scale holder, mounting brackets, pointer, and "Magic Eye" bracket and clip, assembled, less dial (K-80, RC-415C).....
11765 Lamp—Dial lamp.....
35014 Mounting—Rubber cushion, spacer, and washers, for mounting chassis (4 required) .....

Oscillation or Instability:

Tendency of loop receivers (K-60, K-80) to oscillate, or the presence of excessive regeneration, may be caused by improper I-F alignment. To correct, re-align the chassis for "symmetrical" wave shape as shown on an oscillograph, rather than for maximum peak output.

Improved Reception on "C" Band:

Connecting an antenna directly to "C" band loop, 2 or 3 inches from the low-end of the loop, provides a step-up transformer action and gives noticeable improvement on short-wave reception. A 1,000-mmfd. capacitor should be connected in series with the antenna.

(59) MODEL R-60

Additional Replacement Part:

Stock No.	
35441	Cone—Speaker cone and voice coil..

(60) MODELS T-60, T-62

Additional Replacement Part:

Stock No.	
30585	Spring—Drive cord spring.....

(61) MODEL X-60

Short-Wave Sensitivity:

Where insufficient sensitivity is noted on the short-wave band of Model X-60, addition of capacity coupling of 3 or 4 mmfd. between signal and oscillator grids of converter tube will usually restore normal sensitivity to entire band. This coupling can be effected in several ways:

(a) Unsolder one grid lead, take several turns around other lead to give desired capacity, resolder.
(b) Twist several turns of insulated wire around both grid leads to give desired value of capacity coupling.
(c) Install a 3 to 4 mmfd. capacitor between tube grids.

(62) MODEL K-61

Additional Replacement Parts:

Stock No.	
35595	Resistor—15,000 ohms, 3 watts (R2)
30585	Spring—Drive cord spring.....

(63) MODEL K-62, RC-415B

Technical Information and Service Data:

Refer to Service Data for loop-type K-60 (RC-415B), and the following parts used in K-62:

Stock No.	
32068	Transformer—1st i-f transformer....
	MISCELLANEOUS ASSEMBLIES
34994	Button—Push button.....
34285	Clip—Tuning indicator clip.....
35387	Decalcomania—"Power-Volume" decal.....
35392	Decalcomania—"RCA Victor" decal..
35454	Decalcomania—"Range" decal.....
35453	Decalcomania—"Television-Radio-Victrola" decal.....
35391	Decalcomania—"Tuning" decal.....
34997	Dial—Glass dial scale.....
35561	Escutcheon—Dial scale and push button escutcheon, less scale and buttons .....
35683	Frame—Dial frame complete, less dial, pointer and pointer rods.....
34789	Frame—Frame only for "C" band loop .....
34383	Indicator—Station selector indicator and carriage.....
34998	Knob—Tuning, volume control, tone control or range switch knob....
35931	Loop—Antenna loop for "A" and "B" bands.....
33842	Marker—Station selector marker....
34872	Pin—Complete set of dowel pins for antenna loop.....
34990	Plug—2-prong male plug for "C" band loop.....
32641	Plug—3-prong male plug for antenna loop for "A" and "B" bands.....
33550	Screen—Push button "A Band" marker screen.....
34491	Shaft—Pointer carriage guide rod...
14270	Spring—Retaining spring for knob, Stock No. 34998.....

(64) MODEL T-63

Additional Replacement Parts:

Stock No.	
31456	Cover—Celluloid covers (20) for push buttons .....
33973	Marker—Station call letter markers.

Model K-62 (RC-415B).

(65) MODEL T-64

Additional Replacement Parts:

Stock No.	
35441	Cone—Speaker cone and voice coil..
33505	Knob—Volume control knob.....
33470	Knob—Range selector knob.....
33553	Knob—Tone control knob.....
33471	Knob—Tuning control knob.....

(66) MODEL T-65, RC-416

Technical Information and Service Data:

Refer to Model T-64 Service Data, and the following parts used in T-65:

Stock No.	
34994	Button—Push button.....
35392	Decalcomania—"RCA Victor" decal.
35463	Decalcomania—"Range" decal.....
35462	Decalcomania—"Television — Radio — Victrola" decal.....
35457	Dial—Glass dial scale.....
35455	Escutcheon—Dial scale and push button escutcheon less dial scale and buttons .....
35456	Frame—Dial frame complete less dial scale, station selector indicator, and indicator guide rods.....
34790	Indicator—Station selector indicator..
35458	Knob—Range switch knob.....
35459	Knob—Tone control knob.....
35460	Knob—Tuning knob.....
35461	Knob—Volume control and power switch knob.....
33842	Marker—Station selector markers...
33550	Screen .....
34491	Shaft — Station selector indicator pointer guide shaft.....
4982	Spring—Retaining spring for knob, Stock No. 35461.....
14270	Spring—Retaining spring for knob, Stock Nos. 35459, 35460.....
30330	Spring—Retaining spring for knob, Stock No. 35458.....

Model T-65 (RC-416).

(67) MODEL M-70

Additional Replacement Part:

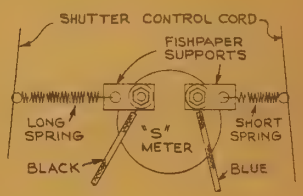
Stock No.	
35253	Power cable and plug.....

(68) MODEL AR-77

Dial Shutter Control Cords:

Under certain conditions it is possible for the dial shutter control cord to slip off its idler pulleys. The RCA Stock No. 36400 kit of parts, when properly installed, will effectively prevent this from taking place. Installation is a simple matter and may be completed quickly:

(a) Disconnect the receiver from the power supply line.
(b) Remove the hardware and the wire lead from each of the two outer terminal posts at the rear of the "S" meter.
(c) Mount one of the fishpaper supports (by means of one of the punched holes) on each of terminal posts.
(d) Replace the lead and the hardware belonging to each terminal post.
(e) Install the short spring between the "S" meter fishpaper support on the right (when facing the rear of receiver) and the black shutter control cord.
(f) Attach the coil end of the long spring to the meter support on the left (when facing rear of receiver), and the straight end to the black shutter control cord.



Rear View of Completed Shutter Cord Support Assembly in AR-77.

(69) MODEL K-80, RC-415A

Additional Replacement Parts:

Stock No.	
35014	Mounting for chassis, rubber cushion, spacer and washers (4 required)..
36078	Drive—Tuning knob drive assembly.
34969	Washer—Felt washer for under control knobs.....

(70) MODEL T-80

Additional Replacement Part:

Stock No.	
35014	Mounting—Rubber cushion, spacer, and washers for chassis mounting (4 required) .....
35441	Cone—Speaker cone and voice coil..
33505	Knob—Volume control knob.....
33470	Knob—Range selector knob.....
33553	Knob—Tone control knob.....
33471	Knob—Tuning control knob.....

(71) MODEL K-82, RC-415C

Technical Information and Service Data:

Refer to Service Data for loop-type K-80, which uses the same chassis (RC-415C).

Replacement parts for Model K-82 are listed below:

Stock No.	
	CHASSIS ASSEMBLIES (RC-415C)
33620	Arm—Push arm and cam assembly on tuning unit—less lock screw.....
33432	Arm—Trip arm and set screw located on range switch shaft.....
34574	Board—"Ant.-Grd." terminal board.
12581	Cap—I-F transformer shield cap....
30766	Cap—Rubber cap for Magic Eye...
34573	Capacitor—Trimmer, 2 sections 2-10 mmfd. each.....

34572	Capacitor—Trimmer, 2 sections 4-50 mmfd. each
12714	Capacitor—Air-trimmer, 2-12 mmfd.
14079	Capacitor—6.8 mmfd.
34580	Capacitor—39 mmfd.
12723	Capacitor—56 mmfd., moulded
30949	Capacitor—56 mmfd., mica
30904	Capacitor—100 mmfd.
30232	Capacitor—220 mmfd.
30433	Capacitor—470 mmfd.
34581	Capacitor—650 mmfd.
30057	Capacitor—2,700 mmfd.
31399	Capacitor—4,700 mmfd.
5107	Capacitor—.0025 mfd.
33584	Capacitor—.005 mfd.
4838	Capacitor—.005 mfd.
4937	Capacitor—.01 mfd.
32787	Capacitor—.05 mfd.
32786	Capacitor—0.1 mfd.
33014	Capacitor—Electrolytic, 3 sections 10 mfd., one section 20 mfd.
34579	Coil—Oscillator coil
34578	Control—Tone control
34695	Control—Volume control and power switch
32635	Cord—Condenser drive cord
32634	Cord—Drive cord
32713	Core—Adjustable core and stud for oscillator coil
36078	Drive—Tuning knob drive assembly
33627	Drum—Condenser drive drum
33174	Drum—Drive cord drum with set screws and calibrator dial
11765	Lamp—Dial lamp
33625	Plate—Front guide plate for push arms
5040	Plug—4-contact female for speaker cable
33427	Pulley—Drive cord pulley and mounting bracket
33626	Pulley—Drive pulley — less bronze drive cord
30735	Resistor—560 ohms, 1 watt
14024	Resistor—2,700 ohms, ½ watt
12695	Resistor—15,000 ohms, ½ watt
33489	Resistor—15,000 ohms, 2.5 watt
12454	Resistor—33,000 ohms, ½ watt
5132	Resistor—47,000 ohms, 1/10 watt
12286	Resistor—56,000 ohms, ½ watt
12285	Resistor—470,000 ohms, ½ watt
12013	Resistor—1 meg., 1/10 watt
12679	Resistor—2.2 meg., ½ watt
30271	Resistor—4.7 meg., ½ watt
13601	Resistor—10 meg., ½ watt
30340	Retainer—Retainer for shaft of tuning shaft cam and arm
33419	Roller—Friction roller for tuning knob shaft
14350	Screw—No. 8-32 square head set screw for drum
33621	Screw—Push arm lock screw
33624	Shaft—Tuning condenser drive shaft and washer
33422	Shaft—Tuning shaft — less friction roller
34575	Socket—3-contact female, for loop input
31364	Socket—Dial lamp socket
13871	Socket—Magic Eye tube socket
14278	Socket—Phonograph or Television input socket
31319	Socket—Tube socket
33175	Spring—Drive cord tension spring
33623	Spring—Drive drum cord spring
33622	Spring—Push arm return spring
33421	Spring—Tuning shaft flat spring
33420	Spring—Tuning shaft cam spiral spring
34577	Switch—Range switch
32068	Transformer—First I-F transformer
32825	Transformer—Second I-F transformer
33618	Transformer — Power transformer — 105-120 volts, 25-60 cycle
33112	Transformer — Power transformer — 105-120 volts, 50-60 cycle

SPEAKER ASSEMBLIES
(RL-70J1)

31825	Cap—Cone center dust cap
11469	Coil—Hum neutralizing coil
33116	Coil—Speaker field coil
31275	Cone—Speaker cone, voice coil and dust cap
5039	Plug—4-prong male, for speaker
33444	Transformer—Output transformer

MISCELLANEOUS ASSEMBLIES

34994	Button—Push button
34285	Clip—Tuning indicator clip
35387	Decalcomania—"Power-Volume" decal
35454	Decalcomania—"Range" decal
35392	Decalcomania—"RCA Victor" decal
35453	Decalcomania—"Television-Radio-Victrola" decal
35391	Decalcomania—"Tuning" decal

Model K-82 (RC-415C).

34997	Dial—Glass dial scale
35561	Escutcheon—Dial scale and push button escutcheon—less scale and buttons
35683	Frame—Dial frame complete — less dial, pointer and pointer rods
34789	Frame—Frame only for "C" band loop
34383	Indicator—Station selector indicator and carriage
34998	Knob—Tuning, volume control, tone control or range switch knob
35933	Loop—Antenna loop complete
33842	Marker—Station selector marker
34872	Pin—Complete set of dowel pins for antenna loop
34990	Plug—2-prong male plug for "C" band loop
32641	Plug—3-prong male plug for antenna loop for "A" and "B" bands
33550	Screen—Push button "A band" marker screen
34491	Shaft—Pointer carriage guide rod
14270	Spring—Retaining spring for knob, Stock No. 34998

(71A) MODELS 86T3, 86T6, 87T1, 96E, 96T2, 96T3, 96T7, 97T, 97T2

Replacement Field Coil:

Add Stock No. 14616 field coil to the replacement parts for the following models in the 1937 and 1938 Bound Volumes:

1937 Volume, Models 86T3 and 87T1 (page 94)
1938 Volume, Model 86T6 (page 104)
Model 96E (page 112)
Model 96T2 (page 122)
Models 96T3, 97T (page 128)
Models 96T7, 97T2 (page 134)

(72) MODEL R-89

Motor Mounting Screws:

Change Stock number from 13053 to 31053.

Rotor Lamination Identification:

The inner diameter of the rotor laminations is not the same as that of Models R-93B, R-93C, U-111, etc.; and therefore can not be interchanged, or centered with the same gauges. **The R-89 and VA-20 rotors have a "green" dot as a means of identification.**

Model R-93F.

(73) MODEL R-93F

Technical Information and Service Data:

For mechanical and electrical data, refer to Service Data for R-100, which uses similar motors.

Replacement parts for R-93F are listed below.

Stock No.

MOTOR ASSEMBLIES
(110 volts, 25 cycle)
(110 volts, 50 cycle)
See Fig. 1 in R-100 Service Data

31045	Base—Motor support, damper, and bearing cup assembly
31046	Bearing—Bearing assembly
31041	Cap—Rubber spindle cap
31047	Cushion—Rubber cushion for bearing
32077	Motor—110 volt, 25 cycle — less mounting (M1)
31034	Motor—110 volt, 50 cycle — less mounting (M1)
31040	Mountings—Turntable top rubber mountings sufficient for one turntable
32073	Rotor—Turntable and rotor lamination assembly complete for 25 cycle operation
31037	Rotor—Turntable and rotor lamination assembly complete for 50 cycle operation
32072	Stator—Stator coil, laminations, and weights for 105-120 volts, 25 cycles
31043	Stator—Stator assembly complete with coils and laminations for 50 cycle operation
31039	Turntable—Finished turntable top plate only—less rubber mountings
4083	Washer—Leather washer
14231	Washer—Metal spacing washer

MOTOR ASSEMBLIES
(110 volts, 60 cycle)
See Fig. 2 in R-100 Service Data

30244	Bushing—Rubber bushing for turntable center
33345	Cap—Rubber cap for turntable spindle
33346	Coil—Motor field coil
33350	Frame—Motor mounting frame and bearing cup assembled
33344	Frame—Rotor frame, spindle shaft and laminations
34480	Hanger—Rubber hanger for mounting motor
34479	Lamination—Stator laminations and bearing assembled
33041	Ring—Retaining ring for turntable
31039	Turntable

PICKUP AND ARM ASSEMBLIES

33591	Arm—Pickup arm only—less cartridge, base and cable
34481	Arm—Pickup pivot arm and shaft
34482	Base—Pickup mounting base
33122	Crystal—Pickup crystal cartridge and needle screw
33123	Damper—Viscaloid damper for pickup armature
34311	Ring—Retaining ring for pivot shaft
33529	Screw—Needle screw

MISCELLANEOUS ASSEMBLIES

31051	Foot—Rubber foot for cabinet
3961	Knob—Volume control knob
31054	Mounting—Pickup arm mounting nuts, washer, and rubber spacer
31048	Plug—2-contact male plug for output cable
33359	Volume control and switch

(74) MODEL 94BP1 SERIES

1st-Production, RC-407:

The following notes apply only to the 1st-production of Models 94BP1 Series (94BP-61, -62, -64, -66, -80, -81).

Antenna Attachment:

Due to the "extended" service that the 94BP1 Series radio has been put to use by many of its owners—such as service on small boats, camping trips, and other uses in locations far distant from a reliable broadcasting source—there have been requests for information on the use of an antenna to be used in conjunction with the receiver.

The radio is one of high sensitivity, but where few stations are receivable, two methods of using an external antenna may be used:

(a) Five to ten turns of wire may be wrapped around the left end (loop end) of the cabinet attaching one end of the wire to a high antenna and the other to ground.

(b) One to two turns of insulated wire may be wrapped around one end of the loop in the cabinet, making connections to the end of an external antenna and ground. The wire may be fastened to the loop supports with scotch tape or string and the ends brought out through the rear of the cabinet making a permanent attachment for an outside antenna.

If care is taken in placing the wire around the loop (using small 22 gauge D.C.C. wire spaced as far as possible from the loop winding) the receiver will not have to be realigned, and the directional effect of the loop will not be so prevalent.

Oscillator Grid Resistor in 1st-Production:

The oscillator grid resistor is changed from 220,000 ohms to 150,000 ohms (Stock No. 14020).

Volume Control Change in 1st-Production:

The volume control is changed from Stock No. 33304 to 34427.

Additional Replacement Parts:

Stock No.

34426 Indicator—On-off indicator.....
32571 Knob—Tan volume control or tuning knob for 94BP-61,-80, and tuning knob for 94BP-64.....
33309 Knob—Tan volume control knob, 94BP-64.....

Circuit Modifications:

Circuit modifications as explained and illustrated below have been effected on the 1st-production (RC-407) Model 94BP1 Series, battery-operated portable receivers. These changes are incorporated on the bulk of production. Wherever it is necessary to service an instrument not having the revised circuit, it is recommended that the changes shown be made.

MATERIAL REQUIRED:

Quantity	Part	RCA Stock No.
2	Capacitor—400 mmf	13894
3	Capacitor—100 mmf	12720
1	Capacitor—1,000 mmf	12635
1	Resistor—390 ohm	30498
1	Resistor—33,000 ohm	30685

PROCEDURE:

(a) Change 820 ohm bias resistor of 1C5G stage to 390 ohms.
(b) Change plate coupling capacitor from .0025 to 400 mmfd.
(c) Change 1H5G plate by-pass from 250 mmfd to 100 mmfd.
(d) Change 300 mmfd of 2nd I-F secondary by-pass to 100 mmfd.
(e) Change .0025 mfd of volume control arm circuit to 400 mmfd.
(f) Change 1C5G plate by-pass from .01 mfd to .001 mfd.
(g) Add 33,000 ohm resistor in series with high end of volume control.
(h) By-pass high end of volume control to chassis with 100 mmfd.

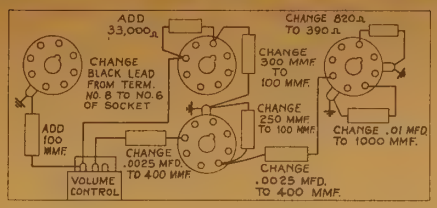
(75) MODELS 95X, 95X-1, 95X-6, 95X-11, 95XL, 95XLW, 96X-1, -2, -3, -4, -11, -12, -13, -14, R-89, U-104

Replacement Speaker RL-78-3:

Stock No. 31201 speaker is superseded by Stock No. 34985 speaker (RL-78-3). The replacement parts for RL-78-3 speaker are:

Stock No.

32907 Cap—Dust cap.....
33555 Coil—Field coil.....
32906 Coil—Neutralizing coil.....
34374 Cone—Cone and voice coil.....
34985 Speaker—Complete .....
33556 Transformer—Output transformer...


ADD 33,000Ω
CHANGE 820Ω TO 390Ω
CHANGE BLACK LEAD FROM TERM. NO. 8 TO NO. 6 OF SOCKET
CHANGE 300 MMF. TO 100 MMF.
CHANGE 250 MMF. TO 100 MMF.
ADD 100 MMF.
CHANGE .0025 MFD. TO 400 MMF.
CHANGE .01 MFD. TO 1000 MMF.
VOLUME CONTROL
CHANGE .0025 MFD. TO 400 MMF.

Circuit Revisions in 1st Production Model 94BP1 Series (RC-407).

(75A) MODELS 96T-4, -5, -6

Oscillation or Instability:

Should an oscillating, squealing, or blocking tendency be experienced on these models it is possible that it results from use of a very short length of wire antenna, causing this circuit to resonate in the I-F range. This may be avoided by increasing length of the antenna, or adding a 100 mfd. capacitor directly across the antenna-ground input terminals. In the event that these operations fail to effect a remedy:

(a) See that the 0.1 mfd. capacitor C-37 mounted under I-F transformer is kept well away from oscillator coils by dressing same close to rear corner of chassis over the I-F leads.
(b) Dress the diode bus lead running from "B" of 2nd I-F transformer to 6SQ7 socket toward chassis away from oscillator coils. Dress 270 mmfd. molded capacitor C-14 over the bus lead.
(c) Add a 0.25 mfd. 200 volt capacitor in parallel with the high capacity electrolytic filter section.

(76) MODELS 96X-1, -2, -3, -4, -11, -12, -13, -14

Additional Replacement Parts:

Stock No.

34053 Spring—Push button retaining spring
34985 Speaker—Complete (RL-78-3).....

The replacement parts for this speaker are listed above in (75).

(77) MODEL R-98

Motor Revision:

The governor motor Stock No. 31461 originally specified on Model R-98 is no longer used, and is replaced by the following:

I—Motor Stock No. 32135—60-cycle, non-governed constant speed type (same as used in U-115).
II—Mounting Adaptor Kit Stock No. 35735—for Stock No. 32135—containing:

(a) 1—Motor mounting adaptor plate.
(b) 3—Screws for mounting plate to motor.
(c) 3—Screws for mounting plate to motorboard.
(d) 3—Spacers for separating plate from motor.
(e) 3—Washers for motor mounting screws.

To install, assemble plate (a) to motor No. 32135 using spacers and screws provided. Mount motor and plate assembly to motorboard of cabinet, using the original flexible mounting grommets and eyelets. If necessary, shift motor or chassis slightly to give clearance between the two. Remove plug from leads of original motor and attach same to leads of new motor.

Hum at Maximum Volume:

Wherever excessive hum is apparent, the dress of the pilot lamp lead should be checked. It should be positioned to the rear of the chassis base, well away from the audio circuits.

RCA Victrola Junior.

Additional Replacement Parts:

Stock No.

33401 Turntable—12-inch diameter.....
33404 Turntable—10-inch diameter.....

(78) MODEL R-100

Additional Replacement Parts:

Stock No.

34429 Spring—Spring for 34428 volume control knob.....
34758 Bushing—1 rubber and 1 metal for pickup arm.....
34428 Knob—Volume control and switch knob .....
34863 Wedge—Wood wedge.....

(79) MODEL U-101

Additional Replacement Part:

Stock No.

35583 Arm—Pivot arm and trip lever for pickup arm, includes pivot pin, bushing, spring, and set screw....

(80) MODEL K-105

High-Frequency Buzz:

Some cases of extraneous high frequency mechanical buzz has been caused by the "diffuser" of the loudspeaker striking the cone, or cabinet baffle. This "diffuser" which is mounted across the front of the speaker, should be entirely removed where such trouble occurs. It is not employed on later production of Model K-105.

Additional Replacement Part:

Stock. No.

36078 Drive—Tuning knob drive assembly.

(81) MODELS U-121, U-127E

Additional Replacement Part:

Stock No.

11865 Cup—Used needle cup.....

(82) MODEL U-123, RC-421

Additional Replacement Part:

Stock No.

33619 Transformer—Power transformer, 25 cycles, 105-125 volts.....

(83) RP-139A, RP-145 CHANGERS

Additional Replacement Parts:

Stock No.

36114 Motor—110 volt, 50 cycle, with capacitor, for RP-145.....
34001 Screw—Ball point screw for record elevating lever.....
35320 Pin—Drive pin for turntable drive disc (Model RP-145) (24).....

(84) RCA VICTROLA JUNIOR No. 41918

Service Data:

The motor in the RCA Victrola Junior is similar to the three-point suspension type used in Model R-100.

Refer to R-100 Service Data for mechanical and electrical data.

Replacement Parts:

Stock No.

34431 Arm—Tone arm complete with diaphragm, armature and needle screw

34433 Base—Tone arm swivel base assembly
33346 Coil—Motor coil, 105-125 volt, 60 cycle (heavy stack).....
33350 Frame—Motor support frame and bearing cup.....
33349 Hanger—Rubber hanger block for motor .....
33347 Lamination—Motor stator laminations and bearing—less field coils (heavy stack).....
35394 Lamination—Motor stator lamination and bearing, less field coils—for motor using thin stack.....
33041 Ring—One retaining ring and one washer for turntable spindle tip...
36201 Rotor—Motor rotor frame, spindle, and laminations, less turntable and spindle cap (heavy stack).....
34432 Screw—Needle screw.....
34435 Turntable—Finished turntable plate.
33348 Washer — Comprising 5 assorted washers for mounting stator assembly on motor support.....

(85) RECORD PLAYER MOTORS

Stator Coils and Laminations:

In view of requests for replacement stator coils only, the following method of stocking has been instituted:

Stator Assem. Stock No.	Used In	Superseded By Coil (2 req'd)	Lamination
31042	R93B, R93C, R91, U111, U104	31917	34878
31043	R93B, R93C, R91, U111, U104	31918	33354
32072	R93B, R93C, U112	33357	33358
31994	R93B, R93C	34962	33354
31925	R89	34963	34878
32022	R89	34964	34960
32916	VA20	32505	34961

When present stocks of Stator Assemblies are exhausted, orders for same will be filled with corresponding Laminations and Coils. Order only the part required.

(86) VICTROLA MECHANISM NOTES

Governor Motors:

Refer to page 349 in this Bound Volume for complete information regarding the lubrication and adjustment of governor-type Victrola motors.

Revised Friction Pad:

Use of the revised felt friction pad Stock No. 34058, referred to in the Service Data on governor motors (page 349), is vital in effectively servicing these motors. The two types of pads are illustrated below:

As may be readily seen, the oil capacity has been materially increased, and capillary "feed" improved.

Gear Noise in Automatic Record Changers, Models U-40, U-42, U-46, etc.:

A small amount of heavy fibrous gear grease, such as "Texaco Crater Compound No. 2," applied to the spindle pinion and main gear teeth, will satisfactorily reduce mechanical gear noise produced at this point. Care should be exercised to avoid getting this grease near or into the spindle bearing. It is best to apply grease while gear is in motion.

A recently developed fibre main gear is being used on later production mechanisms. This type of gear serves to prevent noise. It will be supplied on all future replacement orders for Stock No. 33987.

Turntable Spindle Bearing:

Replacement spindle bearings for automatic record changer motor-boards are available as follows:

Stock No.

35846 Bearing—Spindle bearing for Models U-125, U-25, U-126, U-26, U-128, U-129, U-130, U-30, U-132, U-134, 11QU, 12QU, and U-46..
35847 Bearing—Spindle bearing for record changer RP-145 used in Models U-40, U-42, U-43 and VA-22....

These bearings may be readily substituted for an original faulty bearing:

(a) Remove motor and turntable assembly from motor-board.
(b) Invert motor-board on a vise, supporting it solidly as close to the bearing as possible.
(c) Strike the end (bottom) of the bearing a smart heavy blow with a hammer to drive it from the board.
(d) Insert new bearing, resting its top flat surface against a rigid metal plate, and stake over its mounting collar with a screwdriver or chisel. Be sure bearing is exactly perpendicular to surface of board.

Leather Lid Seal:

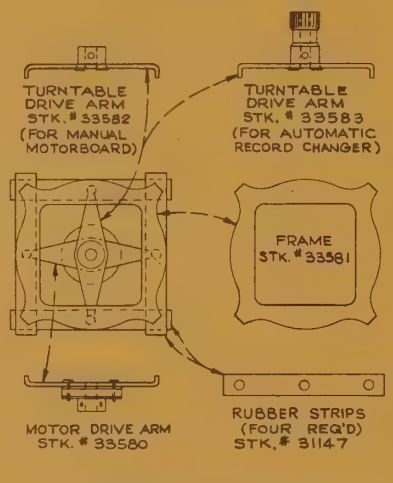
The leather lid welt or beading used around the top edges of Victrola playing compartments can be obtained by ordering Stock No. 35578. This covers a 6-foot length.

Flexible Couplings:

Stock No. 31146 coupling for automatic record changer and Stock No. 31536 coupling for manual motorboards, have been superseded by following component parts:

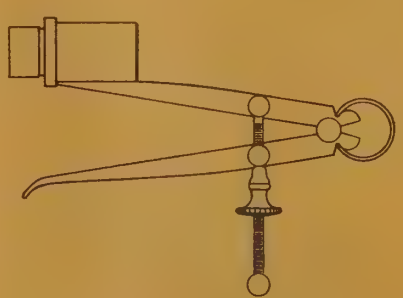
Stock No.

14188 Set screw.....
31147 4 Rubber strips.....
33580 Drive arm, rubber disc, and hub for motor shaft—less set screws.....
33581 Flexible coupling metal frame and support .....
33582 Drive arm and hub for turntable shaft —for manual motorboards only...
33583 Drive arm, hub, and drive gear for turntable shaft—for automatic record changers only.....


TURNTABLE DRIVE ARM STK.# 33582 (FOR MANUAL MOTORBOARD)
TURNTABLE DRIVE ARM STK.# 33583 (FOR AUTOMATIC RECORD CHANGER)
FRAME STK.# 33581
MOTOR DRIVE ARM STK.# 33580
RUBBER STRIPS (FOUR REQ'D) STK.# 31147

Flexible Coupling Parts.

Revised Felt Friction Pad Stock No. 34058 for Governor Motors.

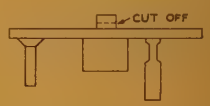


Rotor Centering Calipers for VA-20, R-89, R-93, R-100, etc.

Replacing Trip Pawl Stud:

The following applies to Models 9U, 9U2, 15U, D-22-1, U-107, U-109, etc.:

Remove faulty stud from motorboard, and ream the hole in the board so as to fit replacement stud No. 31023, which mounts with a nut and lockwasher. Cut off portion of top shoulder on trip pawl so that it will fit in same relative position as with original stud. File top surface to give a smooth bearing.



ROTOR CENTERING CALIPERS

For Motors on VA-20, R-89, R-93, R-100, etc.:

A special calipers (Stock No. 36950) is now available for quickly and accurately centering the rotor in these motors.

Exact centering is essential for minimum hum and "wow." The precision of manufacture of these calipers provides checking and centering with an accuracy of .0005 inch.

To use the calipers, lift out the turntable and rotor, slide the caliper onto the rotor shaft, and adjust the calipers to fit the internal radius of the rotor. Rotate the calipers and check for run out, or widening of the radius. Tap the edge of the rotor to move it in the desired direction. Recheck and tap as necessary until rotation of the calipers indicates accurate centering.

SPRING-WOUND MOTORS

Replacing Main Spring in Angle-Wind Motors:

(a) Take out 4 screws from top of motor to remove plate.
(b) To remove the spring barrel, pull the barrel up carefully from the barrel cap, and lift about 3 inches to allow enough space to disconnect the main spring from the arbor.
(c) To remove spring, take a firm hold on the barrel, lift out the center of the spring and uncoil until the spring is completely out of the barrel.
(d) To reassemble new spring, first remove the retaining band by placing spring in vice and unhooking the band. Care should be taken when removing loose spring from the vice.
(e) Engage the slot in end of spring on the barrel hook and wind spring in place, always keeping a firm hold on both.
(Caution: Make sure new spring is wound in the same direction as the old one removed.)
(f) The center of the new spring should be crimped to the size of the arbor so when the spring barrel is put in place it will hook to the arbor. (Note: About a tablespoon of graphite should be put in barrel before closing.) Then follow through as disassembling.

Replacing Main Spring in Side-Wind Motors:

(a) Remove 2 screws in bottom plate, the left-hand screw on top casting, and remove the spring barrel from the frame.
(b) Remove the barrel cap by tapping the edge of the cap with a block and hammer, and disconnect the main spring from the arbor.
Proceed as in steps (c), (d), (e), and (f) above.

(87) ELECTRONIC KITS

One-Tube Kit, Stock No. 41913

Replacement Parts:

Stock No.	
30314	Cap—Grid contact cap
30949	Capacitor—56 mmfd. (brass clamp)
13021	Capacitor—150 mmfd. (brass clamp)
33584	Capacitor—.005 mfd. (paper tube)
4937	Capacitor—.01 mfd. (paper tube)
32548	Capacitor—Electrolytic, 12-20 mfd.
41906	Headset
32116	Knob—Tuning control knob
41905	Microphone
32621	Relay
14559	Resistor—10,000 ohms, ½ watt
30492	Resistor—22,000 ohms, ½ watt
13730	Resistor—1 meg., ½ watt
13601	Resistor—10 meg., ½ watt
31251	Socket—Tube socket
33067	Soldering Iron
34170	Transformer—Power transformer
34172	Tuner—Tuning mechanism and coil complete

Two-Tube Kit, Stock No. 41908

Replacement Parts:

Replacement parts for the two-tube kit are same as above, except the power transformer, which is Stock No. 34171, and the following additional parts:.

Stock No.	
12741	Capacitor—0.5 mfd. (paper tube)
12267	Resistor—1,200 ohms, ½ watt
12486	Resistor—560,000 ohms, ½ watt

(88) RCA TUBE TESTERS

Modernization Kits:

RCA in keeping with its policy of minimized obsolescence has made available the necessary modernization kit and other accessories to modernize the older tube testers models 156, 156A, 156B, and 156C so that they will test new tubes which have been announced since these testers were made. The following paragraphs contain this information and tell what items are required in each case.

To modernize RCA tube testers type **156** or **156A** the Stock No. 9901B conversion kit should be used. This kit includes the latest type roll chart (Stock No. 35851) which is used in the type 156D and 156E tube testers.

To modernize testers type **156B and 156C** having serial numbers from 501 to 1,000 the Stock No. 35851 roll chart and Stock No. 35299 miniature base socket should be used.

To modernize testers type **156B and 156C** having serial numbers above 1,000 the Stock No. 35851 roll chart should be used.

The parts and kit for modernization listed above all include instructions for installation. After the modernizations described above have been completed the tube testers will test all types of tubes which the models 156D and 156E will test.

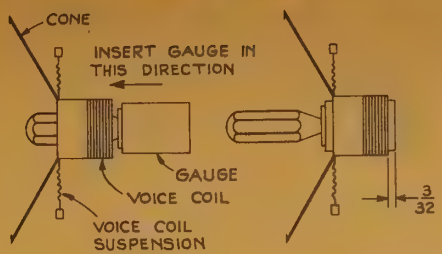
ARM AND LOCK

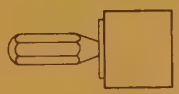
For Push-Button Mechanism:

Stock No. 35600 covers the push arm assembly and lock, **less** belt and spring, in the following models:

RC No.	Model No.	RC No.	Model No.
418	T-55, T-56	473A	X-55
418A	K-50	474D	X-60
418B	U-10	497	K-50 (2nd)
425	T-60	498	U-20
425A	U-12	498A	U-40
425D	T-62	498B	U-42

Stock No. 35600 Arm and Lock.





RCA STOCK Nº 35300 FOR RL-78, RL-79

RCA STOCK Nº 35301 FOR RL-81, RL-85, RL-86

Using Centering Gauge No. 35300, 35301 When Replacing Cones in RL-78, -79, -81, -85, -86 Speakers.

"LITTLE NIPPERS"

Flexible Spun-glass Resistors:

The following comments pertain to 9TX30, 40X30 and 40X50 "Little Nippers," and all similar chassis having the **Spun Glass Insulation** type of ballast resistor in the filament circuit.

The resistors are wire wound on a spun glass core and covered with a woven glass braid. The fine strands of glass used in this braid are coated with oil and as the new resistor heats up to produce the ballast effect, the oil burns off causing some smoke to emit from the chassis.

The resistors used in later production have the oil burned out in the process of manufacture and the chassis are given a longer heating test to prevent the appearance of smoke when first used by the customer.

As a point of information, the new type of resistor has a current carrying capacity of 400% above its normal load and will only burn out when the circuit becomes shorted either thru accident or a defective tube. These resistors have been subjected to extensive tests in both laboratory and the field and have been found extremely efficient.

Hum with Record Players:

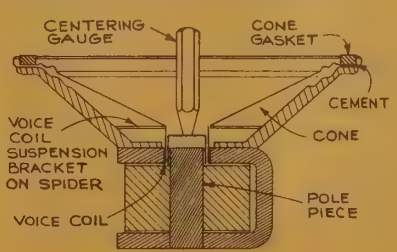
The circuit design of "Little Nippers" is such that the Victrola plug must be removed when not in use, or when it is desired to operate as a radio. The Underwriters' Laboratories did not originally approve an isolating capacitor (between jack and chassis) larger than .01 mfd. on the particular instruments involved. Subsequent approval has been obtained for use of values up to 0.1 mfd., which will reduce hum pickup to an un-objectionable level.

"LITTLE NIPPER" SPEAKERS

Replacing Cones:

To facilitate the economical servicing of the 4-inch "Little Nipper" speakers, two cone-and-voice-coil assemblies have been made available.

Cone Stock No. 35323—should be used for replacement on the following speakers:



Using Centering Gauge No. 35301 When Replacing Cones in "Little Nipper" Speakers.

Speaker Stock No.	Identification Marking On Speaker
32575	39105-1
32963	39105-2
33740	39105-3
34173	39105-4
34569*	39105-3

*Speaker No. 34569 supersedes No. 32963, 33740, and 34173 as a replacement.

Cone Stock No. 35120—is a replacement on the following speakers:

Speaker Stock No.	Identification Marking On Speaker
35119	39105-5
35611	39105-6

The following procedure should be used in making cone replacements:

(a) Remove old cone, all surplus paper and cement from rim of speaker housing. See that air gap is uniform and clean.

(b) Carefully insert centering gauge (**RCA Stock No. 35301**) into voice coil, handle first, from winding end, and carefully lower cone into position. Check V.C. leads for proper position in respect to terminals.

(c) With cone and voice coil properly centered replace washers and nuts on V.C. suspension bracket.

(d) Apply a ring of cement (Duco Household or Model Aeroplane Cement) around speaker housing under and over outer edge of cone, being careful not to get cement on inner side of cone. Lay cone gasket over outer edge and place speaker in an inverted position on smooth flat surface with ½ inch hole in center for gauge handle to clear, until cement is dry (10 to 20 minutes).

(e) Remove gauge from voice coil, with a rotary motion. Solder V.C. leads in place. Allow sufficient lead to give flexibility; dress them in the plane of motion; taking care that they do not strike against the cone or housing. Cement dust cap on cone over the pole piece.

LOUDSPEAKERS RL-78, RL-79, RL-81, RL-85, RL-86

Replacing Cones:

The installation of the cone in loudspeakers employed on instruments such as T62, T64, T80, U10, U12, BP55, 40X50, may be accomplished readily by use of centering gauges, **Stock No. 35300 for RL-78, RL-79, and Stock No. 35301 for RL-81, RL-85, RL-86.** For best results in replacing a cone, it is essential that the following step by step procedure be used:

(1) Remove original cone and all surplus cement, paper and foreign material from rim of housing and voice coil suspension bracket. See that air gap is uniform and clean.

(2) Apply a liberal coating of cement such as "Duco Household" to the rim of speaker housing and to voice coil suspension bracket.

(3) Carefully insert the centering gauge into the voice coil from the voice coil end, **handle first**; this is important in order to prevent possible damage to the voice coil form. With a twisting motion pull centering gauge into the voice coil leaving 3/32-inch of gauge protruding beyond voice coil end. Be sure to inspect the inside of voice coil form for any foreign matter such as excess cement, etc., before inserting the gauge, otherwise damage to gauge may result if forced into coil form.

(4) By pushing centering gauge over pole piece, cone can be lowered into cantact with cemented surfaces. Smooth wrinkles from cemented surfaces. Be sure that voice coil leads are in correct position with respect to output transformer terminals.

(5) After cone rim and voice coil suspension have been cemented in place allow ten minutes for cement to dry. Pee-wee or alligator clips may be used to clamp cemented surfaces together while drying.

(6) Remove gauge from voice coil, with a rotary motion. This will facilitate its removal without undue force.

(7) When not in use, keep gauge in shipping container to protect it from damage.

RL-79 LOUDSPEAKERS

Replacement Cone No. 35441:

Stock No. 35441 cone for RL-79 loudspeaker supersedes and will be supplied in place of cones Nos. 32934, 33777, 33904, and 34029.

REFINISHING INSTRUCTIONS

Leather-Covered Cabinets:

The original coloring of RCA leather-covered cabinets is not obtained by the use of stain or dye, but is the natural color of the particular kind of leather used. The recommended process of restoring the finish for each type of cabinet is given below:

Raw Hide. First wash the leather covering thoroughly with an alkaline soap and water to remove dirt and grease. Then re-wax the surface with an ordinary paraffine wax to restore the original new appearance. If it is convenient, a more lasting finish may be secured by supplying a thin even coat of clear lacquer instead of the wax.

Cow Hide. Work leather covering with saddle soap until discoloration is removed and a uniformly colored finish is obtained.

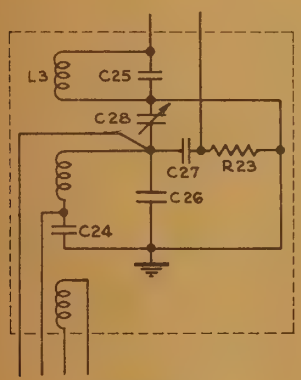
Buffalo Hide. First remove all dirt and grease by washing with an alkaline soap and water. Then work with saddle soap until desired finish is obtained.

Ivory Molded Cabinets:

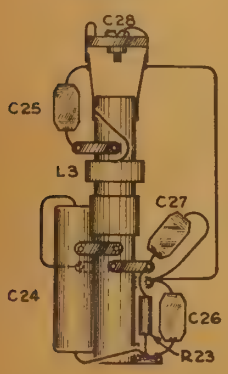
Stock No. 34087, covers a ½ pint can of special touch-up lacquer for use on RCA Ivory lacquer-finished molded cabinets. This lacquer is especially blended for touch-up purposes and can be used successfully for covering cracks, scratches, nicks, etc. in the lacquer finish. The following procedure is recommended:

1. Apply enough touch-up lacquer, with a small brush, to cover the marred or damaged area.
2. Dip a second brush in any standard lacquer solvent and gently brush over retouched surface until old and new lacquers are blended and a smooth finish is obtained.

This lacquer is highly inflammable and should be kept away from open flame.



ORIGINAL



Original Circuit in No. 150 Electronic Sweep Oscillator

Turntables:

The following stock numbers apply to the various types of "flock" used for covering turntables. Refer to page 12 in 1938 Bound Volume of RCA Victor Service Notes for method of application:

Stock No.	For Turntable On Model
32729	U125, U128, U130, U132, U134, U25, U123, U26. U30, etc.....
32730	R93B, R93C, VA20, R89, R-100, etc.
35313	U40, U42, U44, etc.....
35349	U46, etc.....

Each type is stocked in one-half pound packages.

Stock No. 32731 is the varnish undercoater required for applying the "flock" to the turntable. It is carried in one pint containers.

SPECIAL SCREW DRIVER

For "Phillips Head" Escutcheon Screws:

A special screwdriver, RCA Stock No. 34455 will be found very useful for removing and installing the "Phillips" recessed head screws now employed on escutcheons,etc.

Screwdriver No. 34455 for "Phillips" Recessed Head Screws.

MODEL 150 SWEEP OSCILLATOR

Changes for Dual Service:

By making a few changes in the Stock No. 150 oscillator, it can be used either in its original manner as a beat-frequency oscillator, or, by inserting a plug, the beat-frequency action can be eliminated to permit use as a simple variable oscillator with 400-cycle modulation.

Thus it is possible to retain all the good features of beat-frequency operation, or instantly change over to plain oscillator operation in order to eliminate the spurious signals that are inherent in beat-frequency action.

The fixed-frequency 800-kc oscillator is cut out by inserting a dummy or open-circuit plug in the "modulation jack." The circuit is changed as shown in the accompanying sketches to apply 400-cycle modulation to the variable oscillator.

The dial is calibrated for the beat frequency: Therefore when the 800-kc fixed oscillator is cut out by inserting the plug, it is necessary to add 800 kc to the dial readings on the first four bands, and subtract 800 kc from the dial readings on the two high-frequency bands.

When the plug is inserted, the low-frequency limit of the oscillator is 90 plus 800 kc, or 890 kc. Removal of the plug restores the standard dial calibration.

Three parts are required for the circuit change:

(a) One 47,000 ohm ½-watt resistor, Stock No. 12412.
(b) One 1,000 mmfd. mica capacitor, Stock No. 12635.
(c) One 470 mmfd. mica capacitor, Stock No. 30433.

The accompanying drawings show the original and revised connections and are self-explanatory. Note that a small hole must be drilled in the top of the coil form for lead anchorage. (The coil is in a large aluminum shield to the left of the gang condenser, with a green lead coming out on top to the 6A7 grid cap, and a blue lead also coming out on top to the 6F7 grid cap.)

The 470 mmfd. capacitor should be mounted under the chassis adjacent to the 6F7 triode plate.

To operate as a plain amplitude-modulated oscillator, switch the modulation switch to **AMP** position and insert dummy plug in modulation jack. This will produce a 400 cycle modulated signal the frequency of which will be 800 kc lower in frequency than the dial reads for setting above 7,000 kc, and 800 kc higher than the dial reading for frequencies below 7,000 kc.

For normal beat-frequency operation simply remove the dummy plug. This change will not affect the operation in the normal position. It is necessary to have the dummy plug out when it is desired to use it for frequency modulation.

MAGIC WAVE ANTENNA

Poor Short-Wave Reception:

In case of unsatisfactory short-wave reception with the Magic Wave Antenna, check the following:

(a) Remove the transmission line from the terminals D and A on top of the receiver coupling transformer (Stock No. 9813) and check the d-c resistance from A to D. The resistance should be approximately 3 ohms; if it is only a fraction of an ohm, open the transformer and exchange the internal leads between top terminals A and C.
(b) Check the transmission line for internal short circuit. (A shorted transmission line will also effect broadcast reception.)

Refer to the data sheet in this bound volume for diagrams and transformer connections in the Magic Wave Antenna.

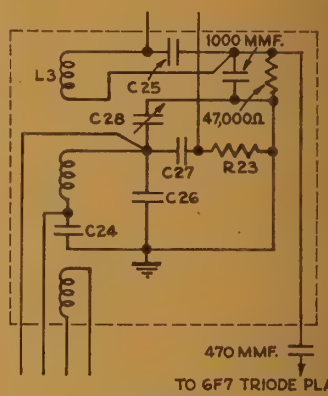
AUTO RADIO RECEIVERS

Unstable Operation:

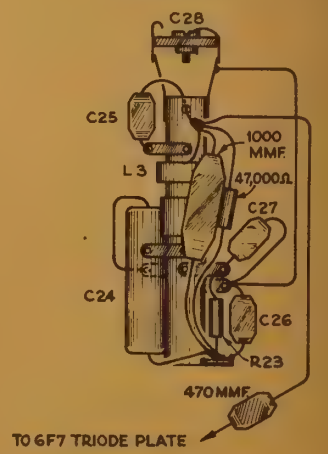
Electrolytic capacitors, when subjected to extreme low temperatures, may be responsible for unstable operation or excessive r-f interference when receiver is first turned on. As a rule this condition is due to the electrolytic(s) not having "formed" completely, resulting in partial filter action, and increased r-f impedance.

To overcome this condition, it is suggested that a .25 mfd. 350-volt paper capacitor, Stock No. 12484, be connected in parallel with the electrolytic output section. This will provide sufficient filter action to prevent the receiver from becoming unstable during the brief warm-up period under cold conditions.

This same problem will occur on home type receivers if tested or operated at very low temperatures.



REVISED



Revised Circuit to Modulate Variable-Frequency Oscillator

LOOP RECEIVERS

Police and Amateur Interference:

The image frequency response of loop receivers is inherently somewhat greater than that of receivers employing conventional antenna circuits. In general, the difference does not account for abnormal interference from stations operating in the image range (1,450 kc—2,500 kc). It is likely, however, that occasional cases occur where this condition will cause complaint. It is recommended that the following treatment be used:

(1) See that loop circuit is precisely aligned, with chassis and loop in cabinet, as directed by Service Notes.
(2) Revolve loop to position which minimizes response from undesired or interfering signals.
(3) Shift I-F frequency, up or down by 10 kc, if interference is on one station only.
(4) Try using an RCA Magic Wave (Stock No. 9812) external antenna. This provides considerable attenuation in the image range. Use a wave trap with this antenna, if found beneficial.
(5) Try grounding receiver, or installing a PLF-10 line filter, if interfering signals appear to be introduced by the power supply.

A wave trap associated with the loop or loop stage is not practical due to its effect on tracking.

REFORMING ELECTROLYTICS

Wet electrolytic condensers may become unformed if left unused and idle for several months. This change is normal and does not indicate inferiority of quality. Since unformed condensers pass a high leakage current they are often rejected erroneously as shorted. It should always be remembered that internal shorts rarely occur in wet electrolytic condensers.

It is recommended that all electrolytic capacitors giving indication of excessive leakage current (more than 5 MA), be formed before being rejected. Reforming can be effected by applying rated DC voltage from a source capable of supplying 100-200 MA, to the condenser for a period from 2 to 10 minutes and longer if required. If abnormal heating occurs, interrupt process and repeat after cooling. A 1,000 ohm resistor should always be connected in series with the condenser during the process, to limit current and reduce tendency to overheat.

ONLY UNIDIRECTIONAL (DC) VOLTAGE SHOULD BE IMPRESSED ACROSS ELECTROLYTIC CAPACITORS AS ALTERNATING VOLTAGE (STRAIGHT AC) WILL CAUSE PERMANENT DAMAGE.

TROPICAL IMPREGNATION

Universal Inter-Stage Transformer:

The Stock No. 9832 universal inter-stage transformer now receives special "tropical" impregnation to withstand extremes of temperature and humidity, adapting it for all services where the operating conditions are severe.

REPLACEMENT PARTS *Guide*

The following index is an addition to "GUIDE" printed in 1938 Bound Volume, and Parts Catalogue No. 104, and gives the stock numbers of the important parts for the instruments listed. RCA Victor parts are exact replacements, are readily identified, and may be purchased from RCA Parts Distributors. Use this guide for quickly finding the part you need. For Prices, refer to RCA Dealer Parts List.

RCA Victor Model	Antenna Coil	R.F. or Detector Coil	Oscillator Coil	1st I.F. Trans.	2nd I.F. Trans.	Output Trans. *Comb. With A.F. Trans.	Cone	Volume Control	Tone Control	Power Trans. (110 V.-60 Cy.)	Filter Pack Or High Voltage Capacitor
4QB	32821 (A, B, C)		32148 (A) 33784 (B) 33785 (C)	32263	32825	33805	33804	33780		33783	33810
4QB4	32706 (X)		33787 (C) 33786 (X)	14261	32825	33805	33804	33780		33783	33810
6QK8	32822 (A, C) 32823 (X)		32707 (A, C) 32931 (X)	14376	32825	14355	31275	33533	33533	32911	32240
7Q4	33762 (A, B, C) 32823 (X)	33763 (A, B, C) 33765 (X)	33764 (A, B, C) 32931 (X)	33759	33761	14355	34615	34389	34403	31735	33014
7Q4X	33762 (A, B, C) 32823 (X)	33763 (A, B, C) 33765 (X)	33764 (A, B, C) 32931 (X)	33759	33761	14628	35193	35187	34403		35188
7QB	31780	31781	32824	14261	14283	32368	35193	31776	31777	31998	32152
7QBK	31780	31781	32824	14261	14283	32368	31275	31776	31777	31998	32152
7QK4	33762 (A, B, C) 32823 (X)	33763 (A, B, C) 33765 (X)	33764 (A, B, C) 32931 (X)	33759	33761	14355	31275	34389	34403	31735	33014
8QU5C 8QU5M	33762 (A, B, C)	33763 (A, B, C)	32824 (A, B, C)	32263	14308	14534	34274	33814		31733	
9Q1	34647—(B, 31) 34648—(25, 19, 16, 13) 34649—(A)	34650—(B, 31) 34651—(25, 19, 16, 13) 34652—(A)	31782 (A) 34659 (B) 34661—13 meter bands 34657—16-19 meter bands 34658—25 meter bands	32263	14308	14534	34615	34667	34666	31733	33014

INSIST ON GENUINE RCA VICTOR REPLACEMENT PARTS

REPLACEMENT PARTS GUIDE (Continued)

RCA Victor Model	Antenna Coil	R.F. or Detector Coil	Oscillator Coil	1st I.F. Trans.	2nd I.F. Trans.	Output Trans. *Comb. With A.F. Trans.	Cone	Volume Control	Tone Control	Power Trans. (110 V.-60 Cy.)	Filter Pack Or High Voltage Capacitor
9Q4	33762 (A, B, C) 32823 (X)	33763 (A, B, C) 33765 (X)	33764 (A, B, C) 32931 (X)	33759	33761	14534	34615	34389	34595	34183	34393
9QK	34647—(B, 31) 34648—(25, 19, 16, 13) 34649—(A)	34650—(B, 31) 34651—(25, 19, 16, 13) 34652—(A)	31782 (A) 34659 (B) 34661—13 meter bands 34657—16-19 meter bands 34658—25 meter bands	32263	14308	14534	31275	34667	34666	31733	33014
9TX50 (RC454)			34443	34441	34442	34174	35065	33291			34597
U9 Spkr. No. RL81-2 (RC482B) Spkr. No. 84843-1 (RC482C) Spkr. No. RL81A-3			34443	34844	34442	34846 34848 35904	34554 34847 35570	34034			34873
U10	33775		33724	33722	33895	32905	32904	33776		33112	32342
U20			32707	33263	34719	33444	34705	34721		34261	32240
40X52 (RC453)			34443	34441	34442	34174	35065	32545			34597
40X55 (RC453)			34443	34441	34442	35056	35066	32545			34597
CV40										34559	32826
U40			32707	32263	34719	33444	34705	34721		34261	32240
BK41	32150		32148	14261	14308	34386	34385	34557			
BT41	32150		32148	14261	14308	32164	32163	30947			
BK42	32150		32573	34118	34119	34508	34507	34120	33458		12635
U42			32707	32263	34719	33444	34705	34721		34261	32240
U43			32707	32263	34719	33444	35616	34721	35738	34261	32240
U44		34697	34579	34698	34524	14534	34705	34780		34539	34533
45X1 (RC457)	35115		35116	35114	33301	34846	35120	35113			32576
45X1 (RC457A)	35115		35333	35331	33301		35120	35330			32576
45X2 (RC457)	35115		35116	35114	33301	34846	35120	35113			32576
45X2 (RC457A)	35115		35333	35331	33301	34846	35120	35330			32576
45X5 45X6	35115		35337	32966	34442	34174	35120	35113			32576
45X11 Spkr. No. 39223-2 Spkr. No. RL86-2 (RC459)			34443	35054	35055	34174 35056	35065 35066	35057			32576
45X11 Spkr. No. 39223-2 Spkr. No. RL86-2 (RC459D)			35579	35346	35347	34174 35056	35065 35066	35344			35348
45X12 Spkr. No. 39223-2 Spkr. No. RL86-2 (RC459)			34443	35054	35055	34174 35056	35065 35066	35057			32576
45X12 Spkr. No. 39223-2 Spkr. No. RL86-2 (RC459D)			35579	35346	35347	34174 35056	35065 35066	35344			35348
45X13 Spkr. No. 39223-2 Spkr. No. RL86-2 (RC459A)			34443	35054	35055	34174 35056	35065 35066	35057			32576
45X13 Spkr. No. 39223-2 Spkr. No. RL86-2 (RC459E)			35579	35346	35347	34174 35056	35065 35066	35344			35348
45X111 Spkr. No. 39223-2 45X112 Spkr. No. RL86-2 45X113			35571	35346	35347	34174 35056	35065 35066	35344			35348
U45		34697	34579	34698	34524	14534	35616	34780	35686	34539	34533
46X1 Spkr. No. 39223-2 Spkr. No. RL86-5 (RC459B)			34443	35054	35055	34174 35056	35065 35066	35057			35064
46X1 Spkr. No. 39223-2 Spkr. No. RL86-5 (RC459F)			35571	35346	35347	34174 35056	35065 35066	35344			35348

INSIST ON GENUINE RCA VICTOR REPLACEMENT PARTS

REPLACEMENT PARTS GUIDE (Continued)

RCA Victor Model	Antenna Coil	R.F. or Detector Coil	Oscillator Coil	1st I.F. Trans.	2nd I.F. Trans.	Output Trans. *Comb. With A.F. Trans.	Cone	Volume Control	Tone Control	Power Trans. (110 V.-60 Cy.)	Filter Pack Or High Voltage Capacitor
46X2 Spkr. No. 39223-2 Spkr. No. RL86-5 (RC459B)			34443	35054	35055	34174 35056	35065 35066	35057			35064
46X2 Spkr. No. 39223-2 Spkr. No. RL86-5 (RC459F)			35571	35346	35347	34174 35056	35065 35066	35344			35348
46X3 Spkr. No. 39223-2 Spkr. No. RL86-5 (RC459C)			34443	35054	35055	34174 35056	35065 35066	35057			35064
46X3 Spkr. No. 39223-2 Spkr. No. RL86-5 (RC459H)			35571	35346	35347	34174 35056	35065 35066	35344			35348
46X11 Spkr. No. 39223-4 46X12 Spkr. No. RL86-4 46X13	35090		31296 (A) 35251 (B)	35054	35055	35056	35065 35066	35086			32576
46X21 46X23	35713 (C)		35714 (A, C)	35088	35089	35666*	35569	35086			35673
46X24	35661 (C)		35667 (A, C)	35088	35089	35666*	35569	35086			35673
U46		34697	34579	34698	34524	12568	14602	35023	35022HF 35026LF	35027	35017 35016
K50 (RC497)			33724	32263	34719	33779	31275	34796	33634	33112	32240
BP55			34877	34466	34466	34555	34554	34465			34965
X55			33724	33722	34026	34803	34554	33631			34212
BP56			34877	34466	34466	34555	34554	34465			34965
T56			33724	33722	33723	32905	32904	33631		33112	32342
K60 (RC415B)			34579	14376	32825	31301	31275	34695	34578	33112	32240
X60	33732		33733	33722	34026	34803	34554	33631			
K61			32707	32263	34524	31301	31275	33215		33112	32240
K62			34579	32068	32825	31301	31275	34695	34578	33112	32240
T63			32707	32263	34719	32905	35441	35585		35587	32240
T65	32821		32824	33428	14308	32905	32934			33112	32240
K80 (RC415C) K80 (RC415D) K81			34579	14376	32825	33444	31275	34695	34578	33112	33014
K82			34579	32068	32825	33444	31275	34695	34578	33112	33014
BP85			34877	34466	34466	34555	34554	34465			34965
94BP61 (RC407B) 94BP62 (RC407B) 94BP64 (RC407B) 94BP66 (RC407B)			33055	33301	33302	33062					33303
96X5	31378		34452	34453	32534			32545			34460
K105		34697	34579	34698	34524	14534	34773	34695	34578	34539	34533
110-K 111-K	35965 "C" & 31 meter		35789	35636	35790	36144	36145	35962	35963	36044	36045
K130		34697	34579	34698	34524	12568	14602	35023	35022HF 35026LF	35027	35017 35016

NOTE—Refer to previous issue of "Guide" and make following correction—Model C8-19, and C8-20 Volume Control should read Stk. No. 11237.

INSIST ON GENUINE RCA VICTOR REPLACEMENT PARTS

RCA Victor

MODELS 5Q5, 5Q55, 5Q56 and 6Q7

Chassis No. RC-396, RC-396, RC-396, RC-414A

Five- and Six-Tube, Three-Band, A-C, Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 10—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGES

"Standard Broadcast" (A)	540-1,720 kc (555-174 m)
"Medium Wave" (B)	2.3-7.0 mc (130-42.8 m)
"Short Wave" (C)	7.0-22.0 mc (42.8-13.6 m)
Intermediate Frequency	455 kc

RCA TUBE COMPLEMENT

(1) RCA-6SA7	First Detector—Oscillator
(2) RCA-6K7	Intermediate Amplifier
(3) RCA-6SQ7	Second-Detector, A.V.C., and A-F Amplifier
(4) RCA-6F6-G	Power Output
(5) RCA-5Y3-G	Full-Wave Rectifier
(6) RCA-6U5 (Model 6Q7)	"Magic Eye"
Pilot Lamp (1)	Mazda 44, 6.3 volts, 0.25 amp.

POWER OUTPUT RATING

Undistorted	1.5 watts
Maximum	3.3 watts

LOUDSPEAKER

Type (5Q5, 5Q55, 5Q56) RL-78-2	5-inch Electrodynamic
(6Q7) RL-79-2	6-inch Electrodynamic
Voice-Coil Impedance	3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 70 watts
Rating B	105-125 volts, 25-60 cycles, 70 watts
Rating C	105-125/200-250 volts, 50-60 cycles, 70 watts

CABINET DIMENSIONS	Models 5Q5, 5Q55 5Q56	Model 6Q7
Height	9⅝ inches	12-5/16 inches
Width	13½ inches	14½ inches
Depth	8⅞ inches	8½ inches
Weight (net)	18½ pounds	16½ pounds

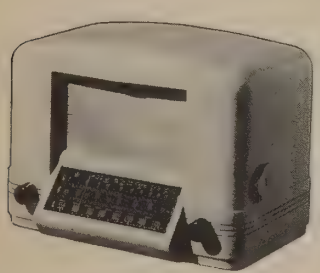
Chassis Base Dimensions	12 in. wide, 5¼ in. deep, 2¾ in. high
Overall Chassis Height	7 inches
Tuning Drive Ratio	18 to 1

General Description

Models 5Q5, 5Q55, 5Q56 and 6Q7 are three-band table type superheterodyne receivers. They are designed to cover the standard broadcast range of 540 to 1,720 kilocycles, and the short-wave range from 2.3 to 22 megacycles.

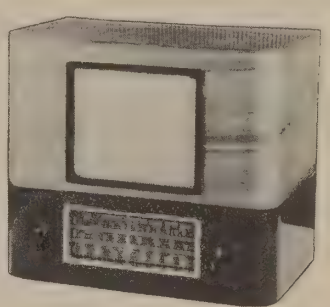
Models 5Q5 and 6Q7 are Export Types.

Features of design include: Magnetite-core I-F transformers; magnetite-core "A" band oscillator coil; automatic volume control; continuously-variable high-frequency tone control on Model 6Q7; edge-lighted straight-line dial; band indicator in dial; jack for Victrola Attachment; and dust-proof electrodynamic loudspeaker.



MODELS	DESCRIPTION
5Q5A	*Brown Plastic Cabinet*
5Q5B	*Black Plastic Cabinet*
5Q5C	*Ivory Plastic Cabinet*
5Q5D	*Maroon Plastic Cabinet*
5Q5E	*Black Plastic Cabinet with Metal Grille*
5Q55	*Mottled Brown Plastic Cabinet*
5Q56	*Ivory Finish Plastic Cabinet*

←



Model 6Q7
Striped Walnut Wood Cabinet

Miscellaneous Service Data

Precautionary Lead Dress

1. Lead from 2nd I.F. (E) to volume control should be kept close to chassis.
2. R.F. coil leads should be kept short and away from coil.
3. Leads to 6,000 mmf. (C10) should be as short as possible and condenser dressed away from chassis, bearing against 10 ohm (R12) resistor.

Victrola Attachment.—A jack is provided on the rear of chassis for connection to a Victrola Attachment. The cable from the attachment should be terminated in a Stock No. 31048 plug to fit the jack.

Loudspeaker.—To center the loudspeaker voice coil, first remove the front dust cover, then loosen the screws holding the spider assembly. Insert three narrow feelers into the air gap, and tighten the spider screws. Remove the feelers and fasten a dust cover in place with loudspeaker cement.

First Edition

Trademarks "Victrola," "Magic Eye" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment. — If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the ground terminal, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the rear of the drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 45 degree mark on the drum scale (see "Drum Drive and Indicator Cord Assembly" drawings) must be in a horizontal position when the plates are fully meshed. The distance from the edge of the chassis to the drum must not exceed $\frac{3}{8}$-inch. The drum is held to the shaft by means of a set screw, which must be tightened securely when the drum is in the correct position.

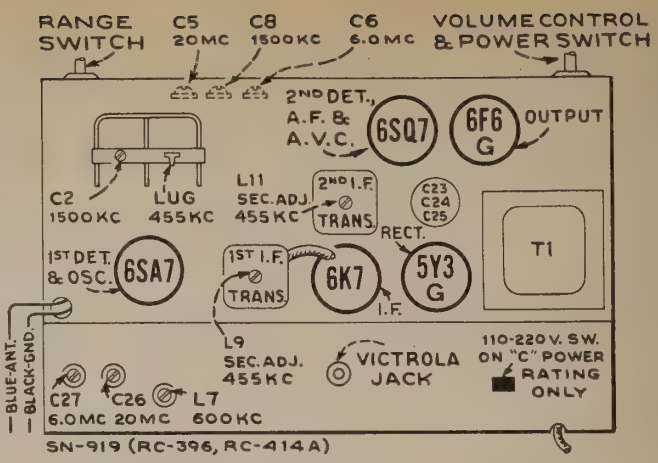
Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "0" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

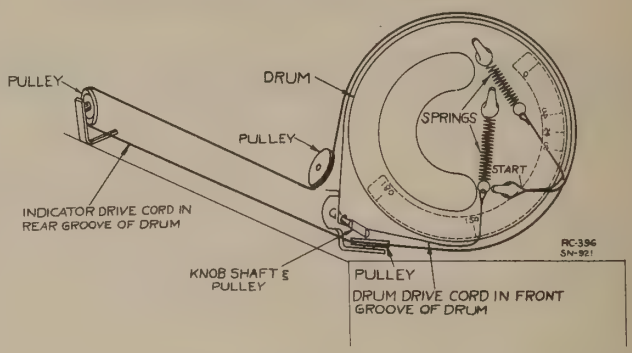
For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	"A" Band quiet point between 550-750 kc	L10 and L11 (2nd I.F. trans.)
2	Tuning condenser stator (osc.) in series with .01 mfd. **	455 kc		L8 and L9 (1st I.F. trans.)
3	Antenna lead (blue) in series with 200 mmfd.	600 kc	600 kc (33°) "A" Band	L7†
4		1,500 kc	1,500 kc (152.4°) "A" Band	C2 (ant.) C8 (osc.)
5	Repeat steps 3 and 4			
6	Antenna lead (blue) in series with 400 ohms	20 mc	20 mc (155.4°) "C" Band	C5 (osc.) * C26 (ant.)
7		6 mc	6 mc (149°) "B" Band	C6 (osc.) * C27 (ant.)
8	Antenna lead (blue) in series with 200 mmf.	1,500 kc	1,500 kc (152.4°) "A" Band	C8 (osc.)

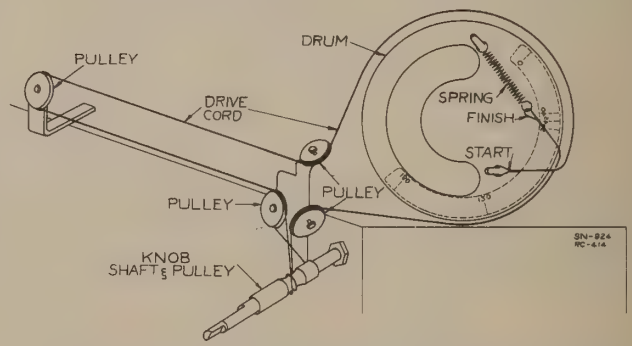
* Use minimum capacity peak if two peaks can be obtained.
† Rock gang condenser slightly while adjusting L7.
** Make test-oscillator connection to lug on tuning condenser stator (oscillator section) in series with .01 mfd. condenser.
Note.—Oscillator tracks 455 kc above signal on all bands.



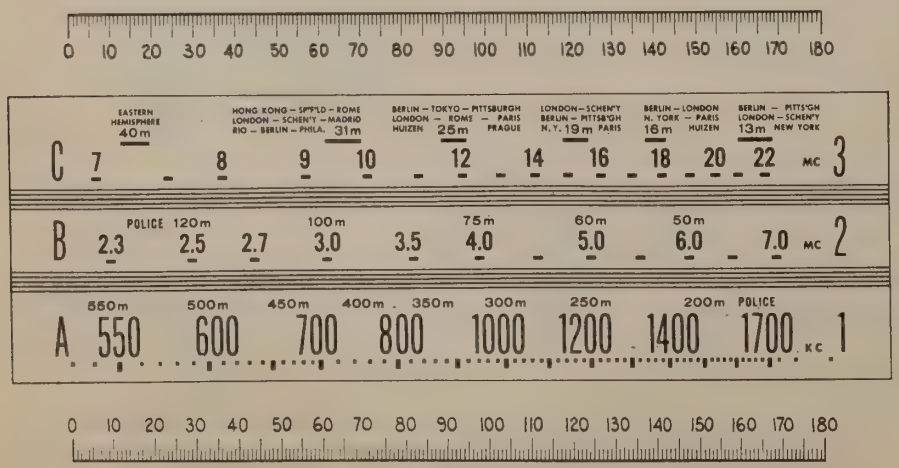
Tube and Trimmer Locations



Arrangement of Drive Cords for Tuning Condenser and Dial Indicator (Models 5Q5, 5Q55 and 5Q56) Drum Shown with Gang at Maximum Capacity



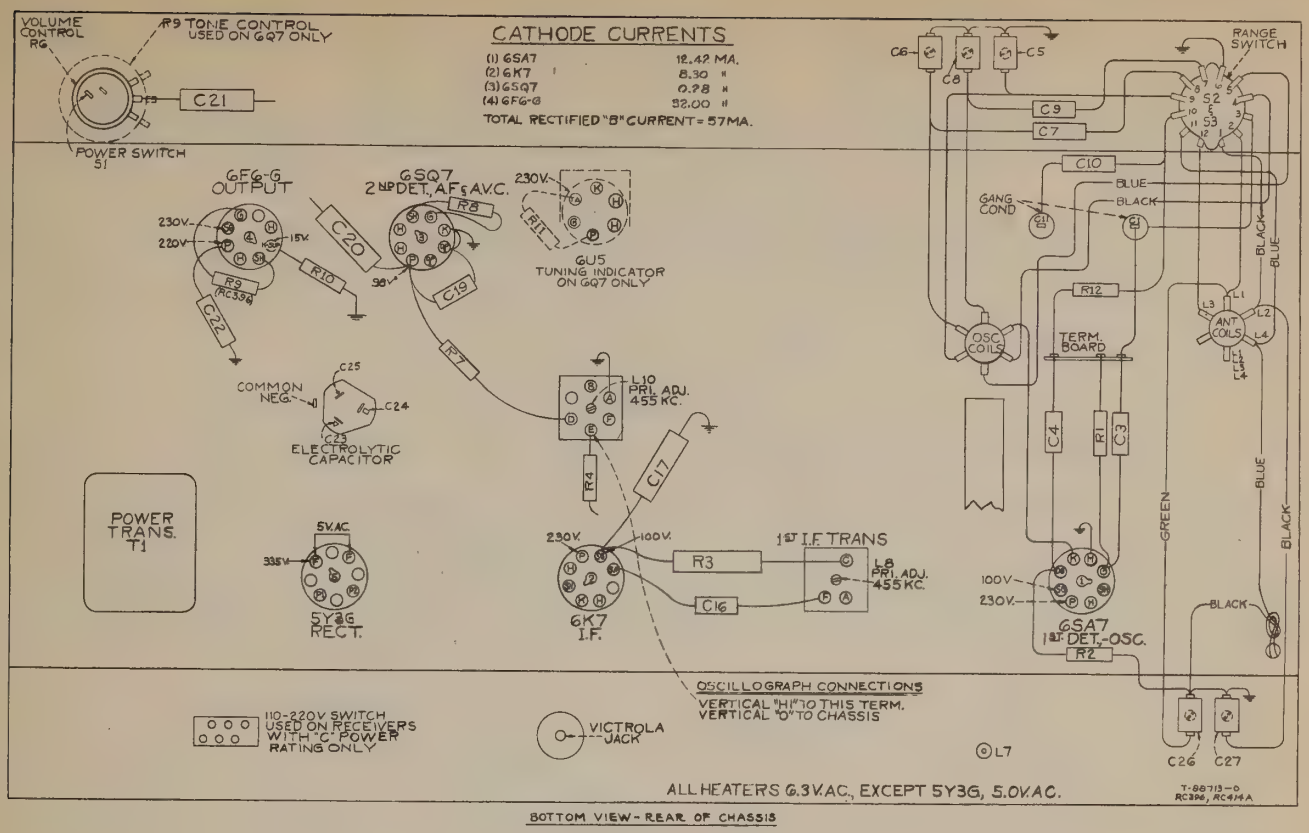
Arrangement of Drive Cord for Tuning Condenser and Dial Indicator (Model 6Q7) Drum Shown with Gang at Maximum Capacity


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
EASTERN HEMISPHERE 40m
HONG KONG – SPT'LD – ROME LONDON – SCHEN'Y – MADRID RIO – BERLIN – PHILA. 31m
BERLIN – TOKYO – PITTSBURGH LONDON – ROME – PARIS HUIZEN PRAGUE 25m
LONDON – SCHEN'Y BERLIN – PITTSB'GH N.Y. 19m PARIS
BERLIN – LONDON N. YORK – PARIS HUIZEN 16m
BERLIN – PITTS'GH LONDON – SCHEN'Y 13m NEW YORK
C 7 8 9 10 12 14 16 18 20 22 MC 3
POLICE 120m 100m 75m 60m 50m
B 2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 7.0 MC 2
550m 500m 450m 400m 350m 300m 250m 200m POLICE
A 550 600 700 800 1000 1200 1400 1700 KC 1
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

Calibration Scale

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

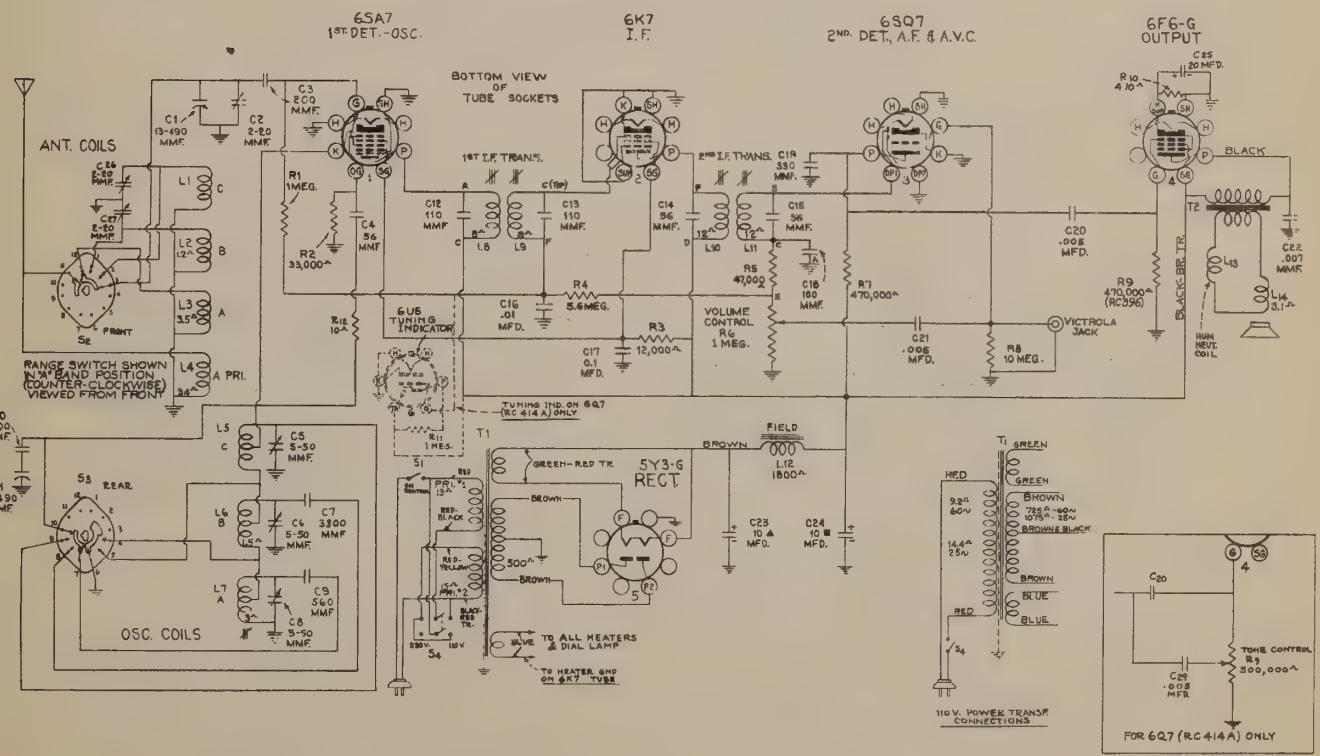
The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 33° on the calibration scale corresponds to approximately 7.9 mc on "C" band, and 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."



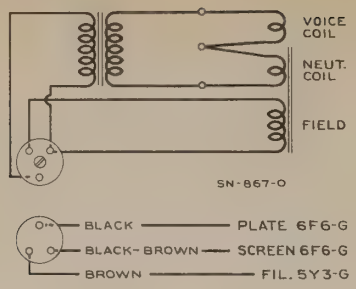
R-F Wiring Diagram and Socket Voltages

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ± 20% with 117-volt a-c supply.

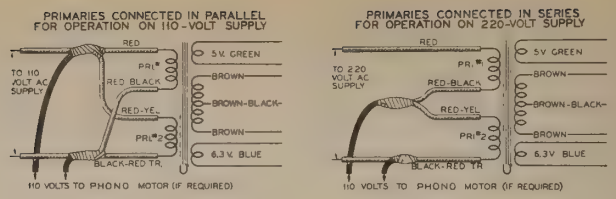
***NOTE:** Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.



Schematic Circuit Diagram



Connections and Colors of Speaker and Cable



D-C Resistance		
	Primary No. 1	13 ohms
	Primary No. 2	15 ohms
	H. V. Secondary (Total)	500 ohms

Connections of Universal Power Transformer Primary for 220 and 110 Volts

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
32832	Bracket—Drive bracket, pulleys, and tuning knob shaft complete (Models 5Q5, 5Q55 and 5Q56)
32635	Cable—Pointer drive cable (Models 5Q5, 5Q55 and 5Q56)
12581	Cap—First I.F. transformer shield cap
12723	Capacitor—56 mmfd. (C4)
30949	Capacitor—56 mmfd. (C14, C15)
14262	Capacitor—109 mmfd. (C12, C13)
32238	Capacitor—110 mmfd. (C18)
12694	Capacitor—220 mmfd. (C3)
12952	Capacitor—330 mmfd. (C19)
12537	Capacitor—560 mmfd. (C9)
31403	Capacitor—3,300 mmfd. (C7)
31405	Capacitor—6,000 mmfd. (C10)
32830	Capacitor—Trimmer capacitor bank, 2 sections 2-20 mmfd. (C26, C27)
32829	Capacitor—Trimmer capacitor bank, 3 sections 5-50 mmfd. (C5, C6, C8)
4838	Capacitor—.005 mfd. (C20, C21, C29)
5148	Capacitor—.007 mfd. (C22)
14393	Capacitor—.01 mfd. (C16)
4839	Capacitor—0.1 mfd. (C17)
32240	Capacitor—Electrolytic, 2 sections 10 mfd., 1 section 20 mfd. (C23, C24, C25)
32821	Coil—Antenna coil A, B, C, bands (L1, L2, L3, L4)
32824	Coil—Oscillator coil—A, B, C bands (L5, L6, L7)
32817	Condenser—2-gang variable condenser (C1, C2, C11)
32634	Cord—Drive cord
32713	Core—Core and stud for oscillator coil adjustment
32835	Drum—Drive cord drum
11891	Lamp—Dial lamp
32953	Plate—Dial back plate and pointer—less dial scale (Model 6Q7)
5119	Plug—3-contact female for speaker cable
32834	Pulley—Drive cord pulley and mounting bracket (1 pulley)
32951	Pulley—Drive cord pulleys and mounting bracket (3 pulleys) (Model 6Q7)
13988	Resistor—10 ohms, ½ watt (R12)
30681	Resistor—470 ohms, 1 watt (R10)
12013	Resistor—1 meg., 1/10 watt (R11) (Model 6Q7)
31389	Resistor—12,000 ohms, 3½ watt (R3)
12454	Resistor—33,000 ohms, ½ watt (R2)
5132	Resistor—47,000 ohms, 1/10 watt (R5)
12285	Resistor—470,000 ohms, ½ watt (R7, R9)
13730	Resistor—1 meg., ½ watt (R1)
11668	Resistor—5.6 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R8)
14343	Retainer—Retaining ring for holding tuning knob shaft (Model 6Q7)
14887	Retainer—Tuning knob shaft retainer (Models 5Q5, 5Q55 and 5Q56)
32848	Screw—No. 8-32 square head set screw for drum
32833	Shaft—Tuning knob shaft, eyelet and retainer (Models 5Q5, 5Q55 and 5Q56)
32932	Shaft—Tuning knob shaft (Model 6Q7)
31365	Socket—Dial lamp insulated socket
31251	Socket—Octal base tube socket
32950	Socket—Magic Eye socket and bracket (Model 6Q7)
14278	Socket—Phonograph socket
31418	Spring—Drive cord or pointer cable tension spring
32819	Switch—Range switch (Models 5Q5, 5Q55 and 5Q56) (S2, S3)
32929	Switch—Range switch (Model 6Q7) (S2, S3)
32827	Switch—Voltage change switch—110-220 volts (S4)
14376	Transformer—First i.f. transformer (L8, L9, C12, C13)
32825	Transformer—Second i.f. transformer (L10, L11, C14, C15, C18, R5)
32910	Transformer—Power transformer—105-120 volts, 25-60 cycles (T1)
32911	Transformer—Power transformer—105-120 volts, 50-60 cycles (T1)
32852	Transformer—Power transformer—105-120 and 200-240 volts, 50-60 cycles (T1)
32818	Volume control and switch (R6, S1) (Models 5Q5 and 5Q55)
32928	Volume control, tone control and power switch (R6, R9, S1) (Model 6Q7)
	SPEAKER ASSEMBLIES Models 5Q5, 5Q55 and 5Q56 (RL-78-2)
32907	Cap—Cone center dust cap
32903	Coil—Speaker field coil (L12)
32906	Coil—Speaker hum neutralizing coil (L13)
32904	Cone—Speaker cone, voice coil, center suspension, and dust cap (L14)
5118	Plug—3-contact male for speaker
32902	Speaker—Complete
32905	Transformer—Output transformer (T2)
	SPEAKER ASSEMBLIES Model 6Q7 (RL-79-2)
32907	Cap—Speaker cone center dust cap
32903	Coil—Speaker field coil (L12)
32906	Coil—Speaker hum neutralizing coil (L13)
5118	Plug—3-prong male for speaker
32933	Speaker—Complete
32905	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
32845	Bracket — Dial mounting bracket and lamp bracket assembly—less pointer and pointer slide rods (Models 5Q5, 5Q55 and 5Q56)
32837	Dial—Dial scale
32843	Knob—Black range switch knob (Models 5Q5 and 5Q55)
33085	Knob—Black tuning knob (Models 5Q5 and 5Q55)
32841	Knob—Black volume control knob (Models 5Q5 and 5Q55)
32839	Knob—Brown tuning knob (Models 5Q5 and 5Q55)
33087	Knob—Ivory range switch knob (Models 5Q5 and 5Q55)
33091	Knob—Ivory tuning knob (Models 5Q5 and 5Q55)
33086	Knob—Ivory volume control knob (Models 5Q5 and 5Q55)
33563	Knob—Maroon range switch knob (Models 5Q5 and 5Q55)
33093	Knob—Maroon tuning knob (Models 5Q5 and 5Q55)
33562	Knob—Maroon volume control (Models 5Q5 and 5Q55
32847	Pointer—Dial pointer, carriage and clip
32846	Rod—Pointer slide rod
4393	Screw—No. 8-32 x 5/16 headless set screw for knob, Stock Nos. 32840, 32842, 32844, 33088, 33089, 33090, 33092 and 33094
32937	Knob—Range switch knob (small) (Model 6Q7)
33029	Knob—Tone control and switch knob (small) (Model 6Q7)
32935	Knob—Tuning knob (large) (Model 6Q7)
32936	Knob—Volume control knob (large) (Model 6Q7)
4982	Spring—Retaining spring for knob, Stock No. 32935 (Model 6Q7)
30330	Spring—Retaining spring for knob, Stock No. 33029 (Model 6Q7)
14270	Spring—Retaining spring for knob, Stock Nos. 32839, 32841, 32843, 33085, 33086, 33087, 33091 and 33093

RCA Victor

MODEL 6Q1

Chassis No. RC-441

Six-Tube, Three-Band, A-C, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast ("A" Band)	540-1,720 kc (555-174 m)
Medium Wave ("B" Band)	2.3-7.0 mc (130-42.8 m)
Short Wave ("C" Band)	7.0-22.0 mc (42.8-13.6 m)

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SK7	R-F Amplifier
(2) RCA-6SA7	1st Detector-Oscillator
(3) RCA-6SK7	I-F Amplifier
(4) RCA-6SQ7	2nd Detector, A.V.C., and A-F Amplifier
(5) RCA-6F6-G	Output
(6) RCA-5Y3-G	Rectifier

POWER OUTPUT RATING

Undistorted	2.5 watts
Maximum	4.5 watts

LOUDSPEAKER (RL-79A-2)

Type	6-inch electrodynamic
V.C. Impedance	3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 75 watts
Rating B	105-125 volts, 25-60 cycles, 75 watts
Rating C	105-130, 140-160, 200-250 volts, 40-60 cycles, 75 watts

At Left—
Model 6Q1

At Right—
Location of Controls

POWER-VOLUME-TONE CONTROL AND PHONO-RADIO SWITCH

RANGE-TUNING CONTROL

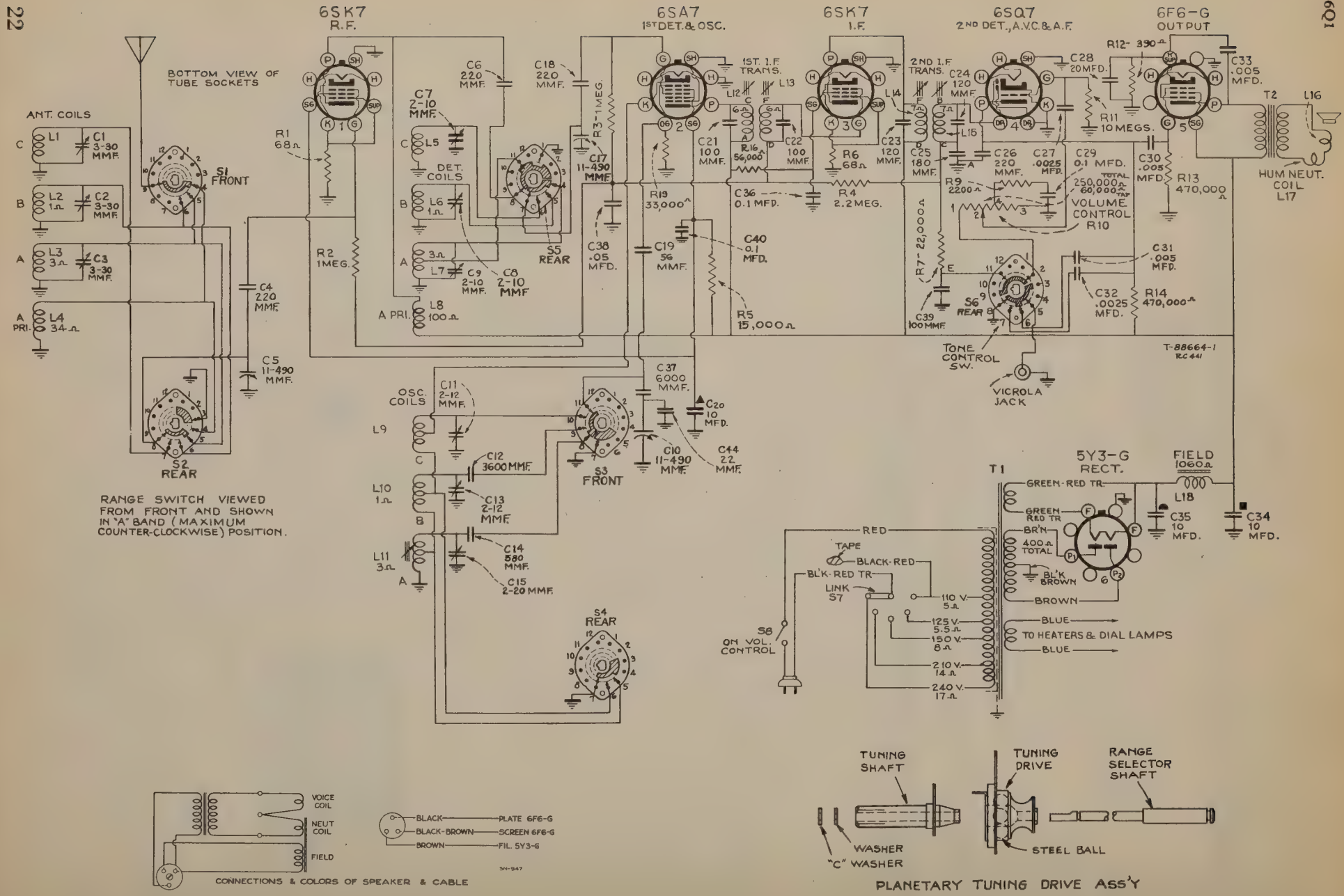
Mechanical Specifications

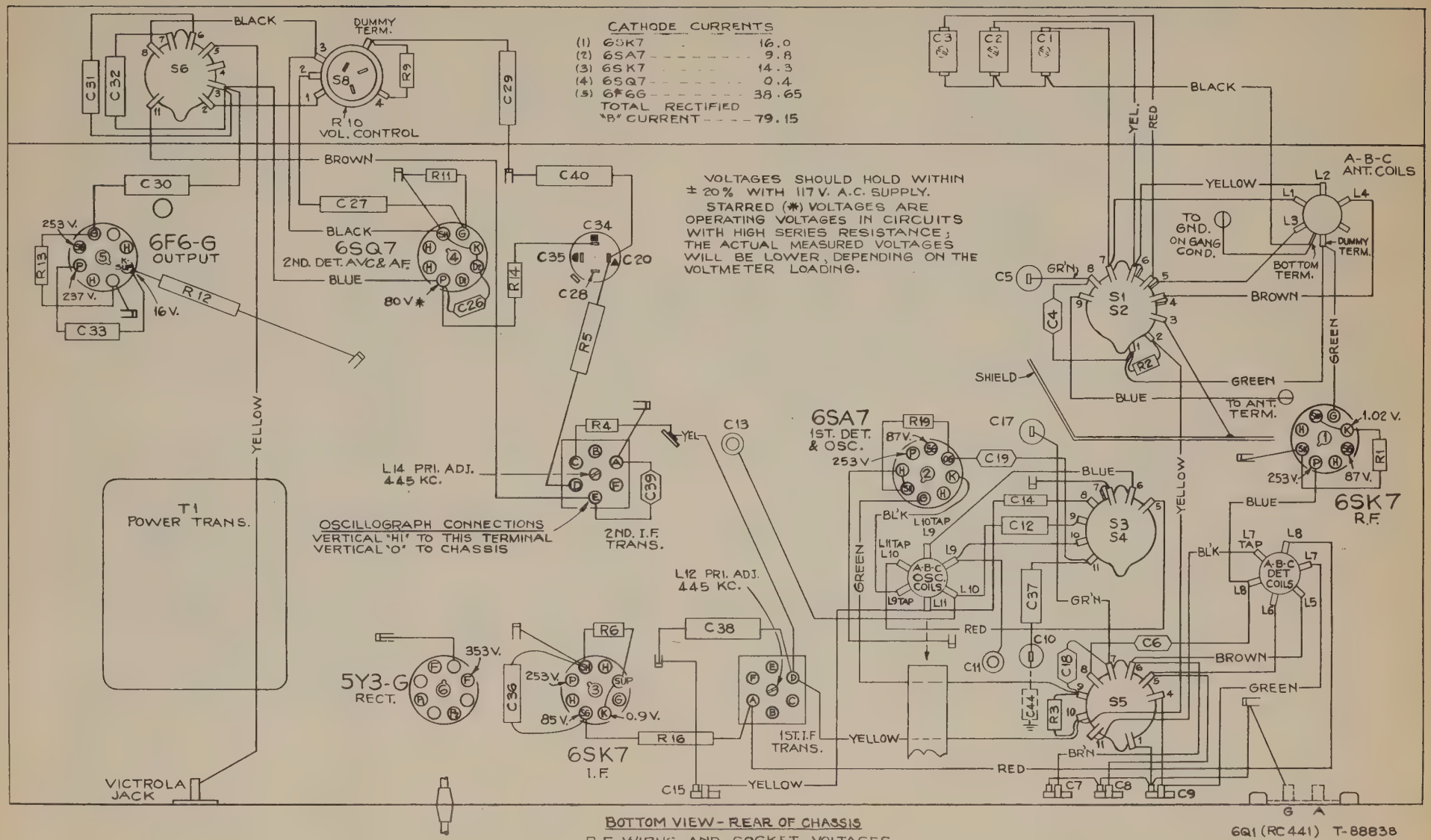
	Height	Width	Depth
Cabinet Dimensions (inches)	12½	16⅝	10 15/16
Chassis Base Dimensions (inches)	2⅞	15⅝	6½
Over-all Chassis Height (inches)			7⅞
Weight (Net lbs.)			24
Tuning Drive Ratio			10 to 1; 50 to 1

First Edition

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.


6SK7
R.F.
6SA7
1ST DET. & OSC.
6SK7
I.F.
6SQ7
2ND DET., A.V.C. & A.F.
6F6-G
OUTPUT
BOTTOM VIEW OF TUBE SOCKETS
ANT. COILS
L1
C1 3-30 MMF.
L2 1Ω
C2 3-30 MMF.
L3 3Ω
C3 3-30 MMF.
L4 34Ω
S1 FRONT
S2 REAR
C4 220 MMF.
C5 11-490 MMF.
R1 68Ω
R2 1MEG.
C6 220 MMF.
C7 2-10 MMF.
L5
DET. COILS
L6 1Ω
L7
L8 100Ω
A PRI.
C8 2-10 MMF.
C9 2-10 MMF.
S5 REAR
C18 220 MMF.
R3 1MEG.
C17 11-490 MMF.
C38 .05 MFD.
R19 33,000Ω
C19 56 MMF.
C40 0.1 MFD.
R5 15,000Ω
C21 100 MMF.
1ST I.F. TRANS.
L12
L13
R16 56,000Ω
C22 100 MMF.
C36 0.1 MFD.
R6 68Ω
R4 2.2 MEG.
C23 120 MMF.
L14
2ND I.F. TRANS.
L15
L16
C24 120 MMF.
C25 180 MMF.
C26 220 MMF.
C27 .0025 MFD.
C28 20 MFD.
C29 0.1 MFD.
TOTAL 250,000Ω 60,000Ω TAP
VOLUME CONTROL R10
R9 2200Ω
R7 22,000Ω
C39 100 MMF.
S6 REAR
C31 .005 MFD.
C32 .0025 MFD.
R14 470,000Ω
R12 330Ω
R11 10 MEGS.
C30 .005 MFD.
R13 470,000Ω
C33 .005 MFD.
T2
L17
HUM NEUT. COIL
TONE CONTROL SW.
VICROLA JACK
T-88664-1
RC 441
OSC. COILS
L9
C11 2-12 MMF.
C12 3600 MMF.
L10 1Ω
C13 2-12 MMF.
L11 3Ω
C14 580 MMF.
C15 2-20 MMF.
S4 REAR
C37 6000 MMF.
C20 10 MFD.
C10 11-490 MMF.
C44 22 MMF.
S3 FRONT
RANGE SWITCH VIEWED FROM FRONT AND SHOWN IN "A" BAND (MAXIMUM COUNTER-CLOCKWISE) POSITION.
T1
5Y3-G RECT.
FIELD 1060Ω
L18
C35 10 MFD.
C34 10 MFD.
GREEN-RED TR.
GREEN RED TR
BR'N
400Ω TOTAL
BL'K BROWN
BROWN
BLUE
TO HEATERS & DIAL LAMPS
BLUE
RED
TAPE
BLACK-RED
BL'K-RED TR.
LINK S7
110 V. 5Ω
125 V. 5.5Ω
150 V. 8Ω
210 V. 14Ω
240 V. 17Ω
S8 ON VOL. CONTROL
VOICE COIL
NEUT COIL
FIELD
BLACK
PLATE 6F6-G
BLACK-BROWN
SCREEN 6F6-G
BROWN
FIL. 5Y3-G
SH-947
CONNECTIONS & COLORS OF SPEAKER & CABLE
TUNING SHAFT
TUNING DRIVE
RANGE SELECTOR SHAFT
WASHER
"C" WASHER
STEEL BALL
PLANETARY TUNING DRIVE ASS'Y


CATHODE CURRENTS
(1) 6SK7 - 16.0
(2) 6SA7 - 9.8
(3) 6SK7 - 14.3
(4) 6SQ7 - 0.4
(5) 6F6G - 38.65
TOTAL RECTIFIED "B" CURRENT - - - - 79.15
VOLTAGES SHOULD HOLD WITHIN ± 20% WITH 117 V. A.C. SUPPLY.
STARRED (*) VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE; THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.
6F6-G OUTPUT
6SQ7 2ND. DET. AVC & AF.
6SA7 1ST. DET. & OSC.
6SK7 R.F.
6SK7 I.F.
5Y3-G RECT.
T1 POWER TRANS.
R10 VOL. CONTROL
A-B-C ANT. COILS
A-B-C OSC. COILS
A-B-C DET. COILS
1ST. I.F. TRANS.
2ND. I.F. TRANS.
L14 PRI. ADJ. 445 KC.
L12 PRI. ADJ. 445 KC.
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL
VERTICAL "O" TO CHASSIS
TO GND. ON GANG COND.
TO ANT. TERM.
VICTROLA JACK
BOTTOM VIEW - REAR OF CHASSIS
R-F WIRNG AND SOCKET VOLTAGES
6Q1 (RC 441) T-88838

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

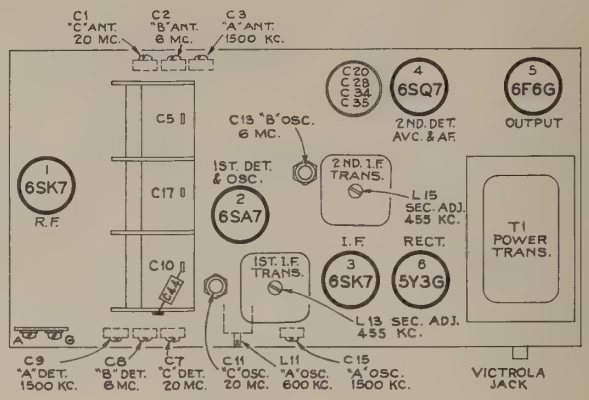
Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 180° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed.

For additional details, refer to booklet "RCA Victor Receiver Alignment."



Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 I-F grid in series with .01 mfd.	455 kc	"A" Band Quiet point between 550-750 kc	L14 and L15 (2nd I-F trans.)
2	6SA7 grid in series with .01 mfd.			L12 and L13 (1st I-F trans.)
3	Ant. terminal in series with 200 mmfd.	600 kc	600 kc (148°) "A" Band	L11 (osc.) Rock gang
4		1,500 kc	1,500 kc (28°) "A" Band	C15 (osc.) C9 (det.) C3 (ant.)
5	Repeat steps 3 and 4.			
6	Ant. terminal in series with 300 ohms	6 mc	6 mc (31°) "B" Band	C13 (osc.)* C8 (det.) C2 (ant.)
7		20 mc	20 mc (23°) "C" Band	C11 (osc.)** C7 (det.) C1 (ant.)

* Use **minimum** capacity peak if two can be obtained. Check to determine that C13 has been adjusted to the correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

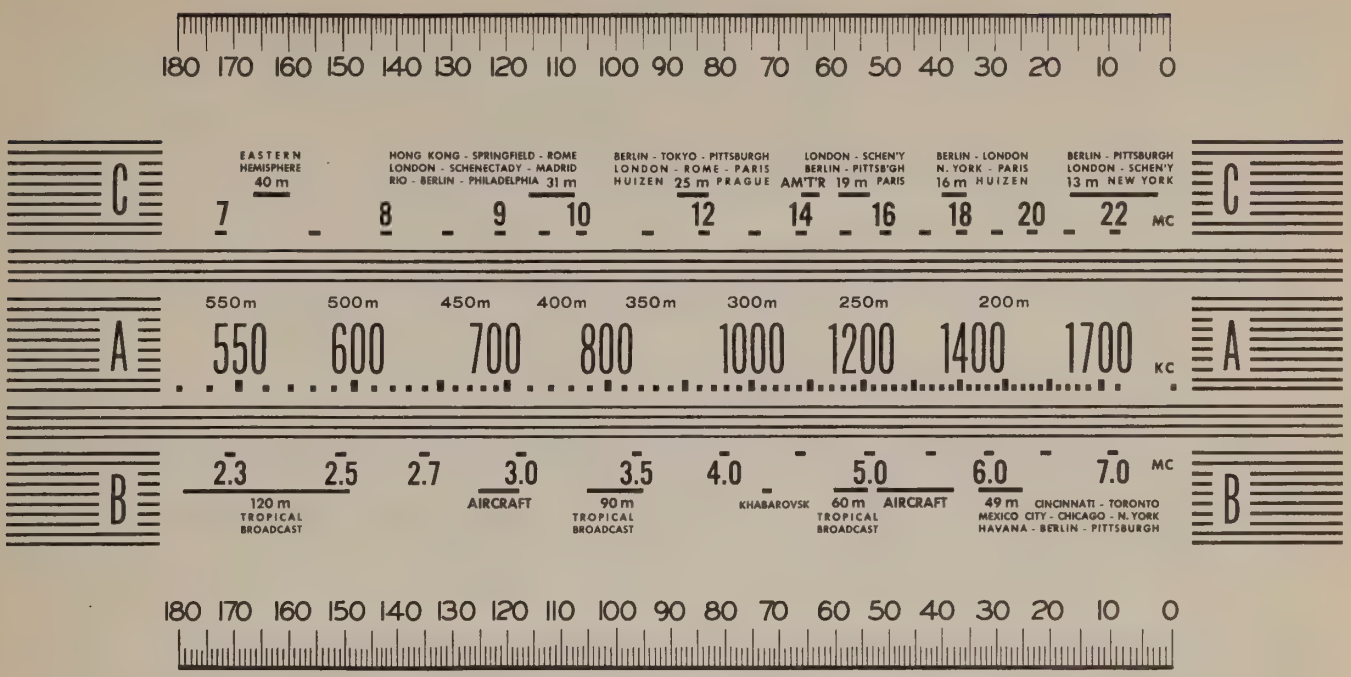
** Use **minimum** capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning the receiver to approximately 19.09 mc where a weaker signal should be received.

Note.—Oscillator tracks **above** signal on all bands.

Precautionary Lead Dress:

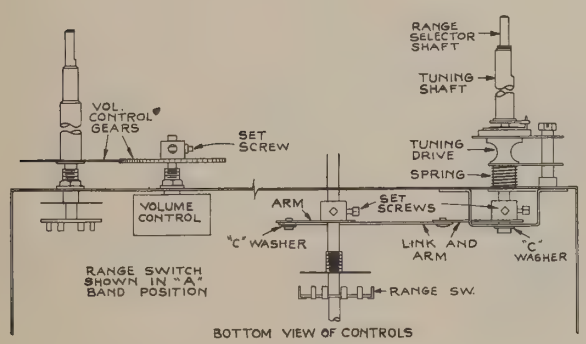
1. Dress yellow lead from antenna coil to first section of range switch away from adjoining wires.
2. Dress green lead from middle section of gang and green lead from 6SA7 to the rear section of the range switch away from chassis, ground leads, other wires and capacitors.
3. Dress brown lead from detector coil to rear section of the range switch away from the detector coil; loop brown lead toward rear apron.
4. Dress black lead from 2nd I. F. transformer "B" to 6SQ7 socket against chassis.
5. Twist power leads together, and dress away from 6SQ7 socket.
6. Dress blue lead from 6SK7 (R-F) socket to detector coil away from chassis, ground shields and other wires.
7. Dress black lead from antenna trimmer (C1) to antenna coil away from range switch link action.
8. Dress black speaker lead around output socket toward power transformer, against base.
9. Keep green lead of 6SK7 R-F grid circuit away from blue antenna lead.

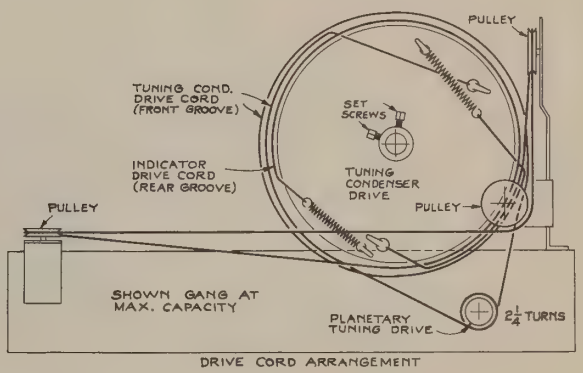
Calibration Scale


180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
C
EASTERN HEMISPHERE 40 m
HONG KONG - SPRINGFIELD - ROME LONDON - SCHENECTADY - MADRID RIO - BERLIN - PHILADELPHIA 31 m
BERLIN - TOKYO - PITTSBURGH LONDON - ROME - PARIS HUIZEN 25 m PRAGUE
LONDON - SCHEN'Y BERLIN - PITTSB'GH AM'T'R 19 m PARIS
BERLIN - LONDON N. YORK - PARIS 16 m HUIZEN
BERLIN - PITTSBURGH LONDON - SCHEN'Y 13 m NEW YORK
7 8 9 10 12 14 16 18 20 22 MC
A
550m 500m 450m 400m 350m 300m 250m 200m
550 600 700 800 1000 1200 1400 1700 KC
B
2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 7.0 MC
120 m TROPICAL BROADCAST
AIRCRAFT
90 m TROPICAL BROADCAST
KHABAROVSK
60 m TROPICAL BROADCAST
AIRCRAFT
49 m MEXICO CITY - CHICAGO - N. YORK HAVANA - BERLIN - PITTSBURGH
CINCINNATI - TORONTO
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 148° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."





REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-441)		12720	Capacitor—100 mmfd. (C39)	
			30904	Capacitor—100 mmfd. (C21, C22)	
			12404	Capacitor—120 mmfd. (C23, C24)	
34502	Arm—Operating arm between knob shaft and range switch shaft		14712	Capacitor—180 mmfd. (C25)	
10194	Ball—Steel Ball		12694	Capacitor—220 mmfd. (C4, C6, C18, C26)	
31767	Board—Antenna-Ground board		33235	Capacitor—580 mmfd. (C14)	
33819	Capacitor—Trimmer capacitor—3 sections of 2-10 mmfd. each (C7, C8, C9)		12811	Capacitor—3,600 mmfd. (C12)	
			31405	Capacitor—6,000 mmfd. (C37)	
12714	Capacitor—Adjustable trimmer—2-12 mmfd. (C11, C13)		5107	Capacitor—.0025 mfd. (C27, C32)	
			33584	Capacitor—.005 mfd. (C30, C31, C33)	
33817	Capacitor—Trimmer capacitor—1 section of 2-20 mmfd. (C15)		32787	Capacitor—.05 mfd. (C38)	
			4839	Capacitor—0.1 mfd. (C29, C36, C40)	
33820	Capacitor—Trimmer capacitor—3 sections of 3-30 mmfd. each (C1, C2, C3)		33014	Capacitor—Comprising 3 sections of 10 mfd. and 1 section of 20 mfd. (C20, C28, C34, C35)	
			33762	Coil—Antenna coil A-B-C-Band (L1, L2, L3, L4)	
31868	Capacitor—22 mmfd. (C44)				
12723	Capacitor—56 mmfd. (C19)		33763	Coil—Detector coil A-B-C-Band (L5, L6, L7, L8)	

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
32824	Coil—Oscillator coil A-B-C-Band (L9, L10, L11)
33756	Condenser—Variable tuning condenser (C5, C10, C17)
33815	Control—Tone control (S6)
33814	Control—Volume control and power switch (R10, S8)
32635	Cord—Indicator drive cord
32713	Core—Core and stud for oscillator coils
33770	Drive—Planetary tuning drive less balls, shafts and shaft retainer
33773	Drum—Variable tuning condenser drum and hub
33185	Gear—Gear and hub for volume control and switch
33767	Link—Operating link between knob shaft and range switch
12471	Plate—Cushion socket mounting plate assembly less socket
14281	Resistor—68 ohms, ½ watt (R1, R6)
31388	Resistor—390 ohms, 1 watt (R12)
13716	Resistor—2,200 ohms, ½ watt (R9)
33489	Resistor—15,000 ohms, 2½ watt (R5)
14284	Resistor—22,000 ohms, 1/10 watt (R7)
12454	Resistor—33,000 ohms, ½ watt (R19)
17440	Resistor—56,000 ohms, 1 watt (R16)
12285	Resistor—470,000 ohms, ½ watt (R13, R14)
13730	Resistor—1 meg., ½ watt (R2, R3)
12679	Resistor—2.2 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R11)
34037	Retainer—Retaining washer for range switch shaft
33772	Shaft—Range switch shaft
33768	Shaft—Shaft and gear for tone control
33771	Shaft—Tuning shaft
31364	Socket—Lamp socket
14278	Socket—Single contact socket and plate for phonograph input
31251	Socket—Tube socket
31418	Spring—Condenser drive cord spring
13638	Spring—Indicator drive cord spring
33769	Spring—Planetary tuning drive spring
33757	Switch—Range switch (S1, S2, S3, S4, S5)
33428	Transformer—First i-f transformer (L12, L13, C21, C22)
14308	Transformer—Second i-f transformer (L14, L15, C23, C24, C25, R7)
31734	Transformer—Power transformer 110 volts, 25 cycle (T1)
31733	Transformer—Power transformer 110 volts, 60 cycle (T1)
31735	Transformer—Power transformer 105/130 140/160 200/250 volts, 50/60 cycle (T1)
	SPEAKER ASSEMBLIES (RL-79A-2)
32907	Cap—Dust cap
33966	Coil—Field coil (L18)
32906	Coil—Neutralizing coil (L17)
5118	Plug—3 prong male speaker plug
32905	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33798	Dial—Dial scale
33797	Frame—Dial frame assembly complete less dial scale
33774	Mounting—Speaker mounting hardware
4982	Spring—Retaining spring for knob Stock No. 34136
14270	Spring—Retaining spring for knob Stock No. 34570
34138	Spring—Retaining spring for knob Stock No. 34571

RCA Victor

MODEL 6Q4

Chassis No. RC-441-A

Six-Tube, Four-Band, A-C, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

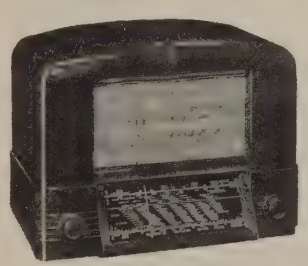
FREQUENCY RANGES

Long Wave ("X" Band)	145-405 kc (2,069-740 m)
Standard Broadcast ("A" Band)	540-1,720 kc (555-174 m)
Medium Wave ("B" Band)	2.3-7.0 mc (130-42.8 m)
Short Wave ("C" Band)	7.0-22.0 mc (42.8-13.6 m)

INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SK7 ..... R-F Amplifier
(2) RCA-6SA7 ..... 1st Detector-Oscillator
(3) RCA-6SK7 ..... I-F Amplifier
(4) RCA-6SQ7 ..... 2nd Detector, A.V.C., and A-F Amplifier
(5) RCA-6F6-G ..... Output
(6) RCA-5Y3-G ..... Rectifier



POWER OUTPUT RATING

Undistorted	2.5 watts
Maximum	4.5 watts

LOUDSPEAKER (RL-79A-2)

Type	6-inch electrodynamic
V.C. Impedance	3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 75 watts
Rating B	105-125 volts, 25-60 cycles, 75 watts
Rating C	105-130, 140-160, 200-250 volts, 40-60 cycles, 75 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	12½	16⅝	10 15/16
Chassis Base Dimensions (inches)	2⅞	15⅝	6½
Over-all Chassis Height (inches)			7⅞
Weight (Net lbs.)			24
Tuning Drive Ratio			10 to 1; 50 to 1

General Description

Model 6Q4 is a table-type receiver incorporating a six-tube, four-band circuit, and housed in a modern streamlined plastic cabinet. Features of design include: Seven-position tone control providing four positions of radio (including one high fidelity position) and three positions of phonograph operation; new magnetite-core I-F transformers, giving increased sensitivity and selectivity; automatic volume control; edge-lighted, angle-vision, straight-line dial; automatic bass compensation.

First Edition

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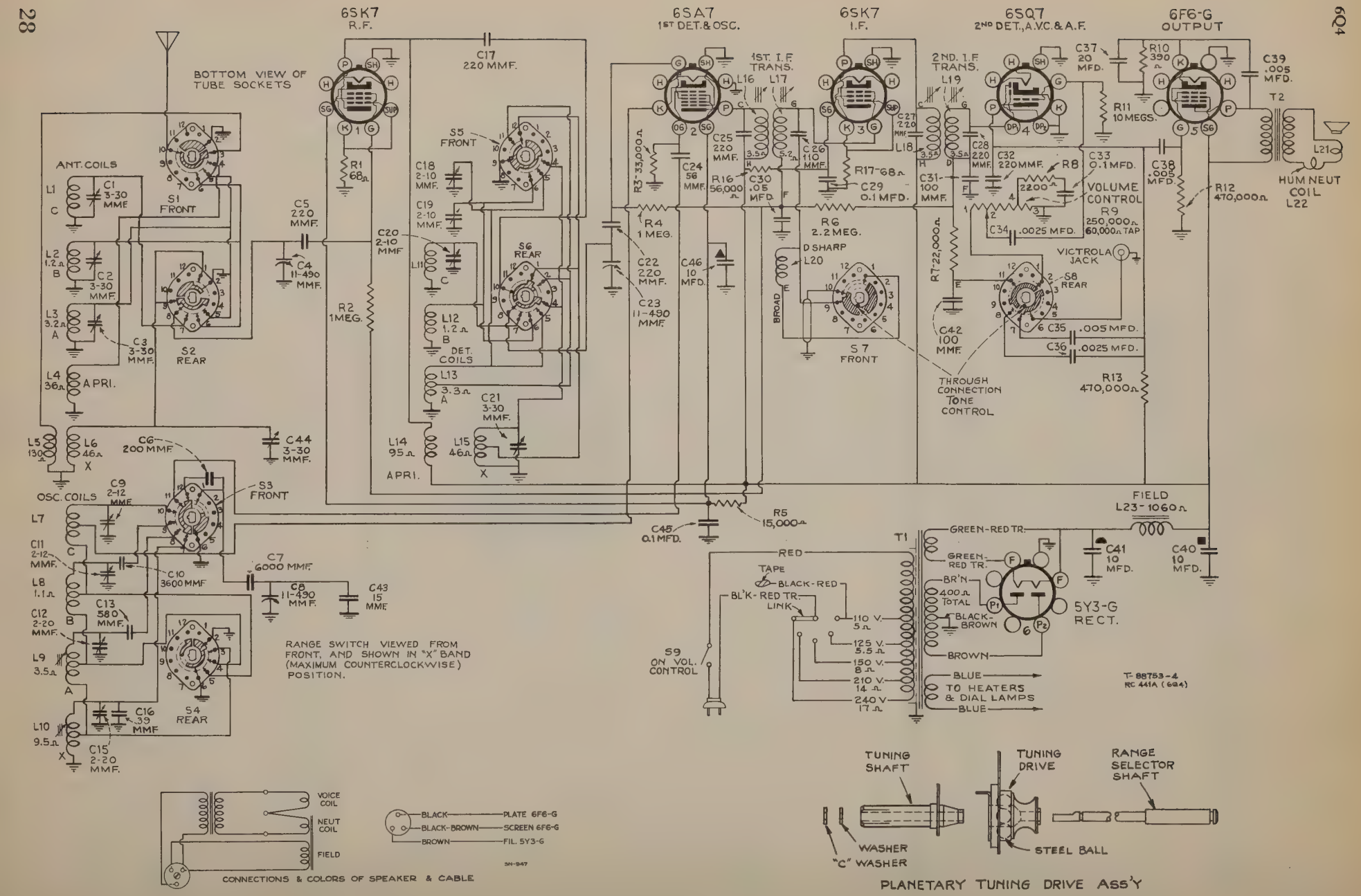
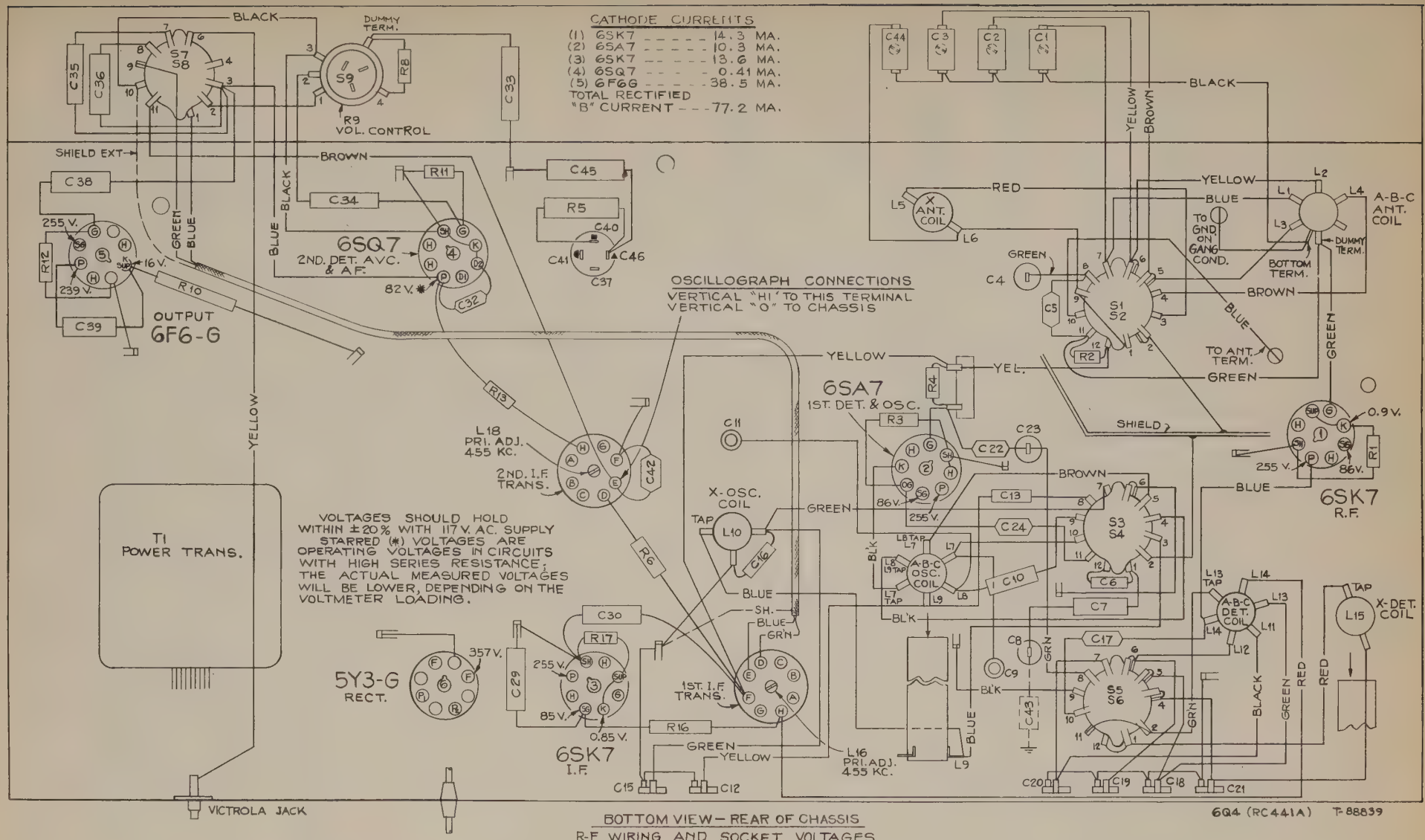
Printed in U. S. A.



CONNECTIONS & COLORS OF SPEAKER & CABLE

PLANETARY TUNING DRIVE ASS'Y


CATHODE CURRENTS
(1) 6SK7 - - - - - - 14.3 MA.
(2) 6SA7 - - - - - - 10.3 MA.
(3) 6SK7 - - - - - - 13.6 MA.
(4) 6SQ7 - - - - - - 0.41 MA.
(5) 6F6G - - - - - - 38.5 MA.
TOTAL RECTIFIED "B" CURRENT - - - 77.2 MA.
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL
VERTICAL "O" TO CHASSIS
VOLTAGES SHOULD HOLD WITHIN ±20% WITH 117 V. AC. SUPPLY
STARRED (*) VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE; THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.
6SQ7 2ND. DET. AVC. & A.F.
OUTPUT 6F6-G
6SA7 1ST. DET. & OSC.
6SK7 I.F.
6SK7 R.F.
5Y3-G RECT.
T1 POWER TRANS.
L18 PRI. ADJ. 455 KC.
2ND. I.F. TRANS.
1ST. I.F. TRANS.
L16 PRI. ADJ. 455 KC.
X-OSC. COIL
A-B-C OSC. COIL
A-B-C DET. COIL
A-B-C ANT. COIL
X ANT. COIL
X-DET. COIL
R9 VOL. CONTROL
TO GND. ON GANG COND.
TO ANT. TERM.
BOTTOM TERM.
DUMMY TERM.
VICTROLA JACK
BOTTOM VIEW—REAR OF CHASSIS
R-F WIRING AND SOCKET VOLTAGES
6Q4 (RC441A) T-88839

Precautionary Lead Dress:

1. Dress black lead from L11 to C20 against terminals 6 and 7 of S6.
2. Dress the green lead from the middle section of the gang away from any other leads, parts, or chassis.
3. Dress the black diode lead running between the 6SQ7 and terminal G on the 2nd I-F transformer, directly against the chassis.
4. Twist the power leads together and dress them away from the 6SQ7 socket.
5. Dress the brown lead from terminal E on the 2nd I-F transformer to terminal 11 on S8 close to chassis.
6. Dress the black lead from trimmer (C1) to antenna coil away from the range switch link section.
7. Dress black speaker lead around the output socket toward the power transformer.
8. Keep green lead of 6SK7 R-F grid circuit away from blue antenna lead.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

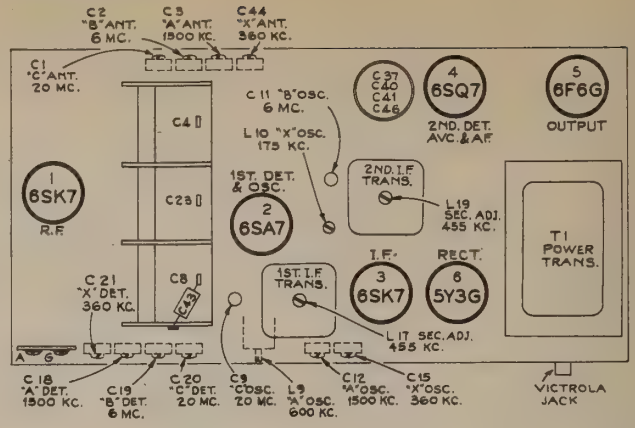
Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

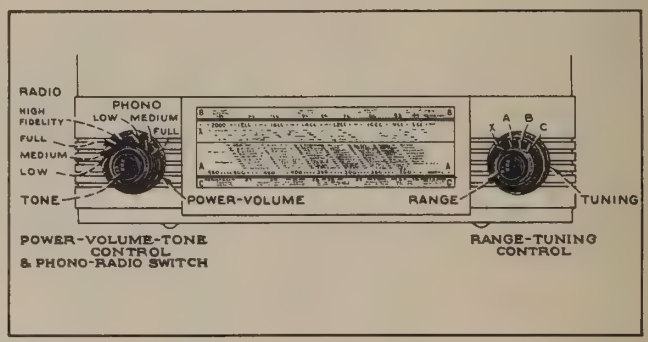
As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 180° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed.

For additional details, refer to booklet "RCA Victor Receiver Alignment."





Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Turn tone control to 3rd position (sharp) from maximum counter-clockwise.			
2	6SK7 I-F grid in series with .01 mfd.	455 kc	"A" Band Quiet point between 550-750 kc	L18 and L19 (2nd I-F trans.)
3	6SA7 grid in series with .01 mfd.			L16 and L17 (1st I-F trans.)
4	Turn tone control to 4th position (broad) from maximum counter-clockwise and check I-F response which should be a slightly double-peaked curve. Leave tone control in 3rd position (sharp) for the following steps.			
5	Ant. terminal in series with 200 mmfd.	360 kc	360 kc (31.5°) "X" Band	C15 (osc.)† C21 (det.) C44 (ant.)
6		175 kc	175 kc (127.2°) "X" Band	L10 (osc.) Rock gang
7		1,500 kc	1,500 kc (28°) "A" Band	C12 (osc.)†† C18 (det.) C3 (ant.)
8		600 kc	600 kc (148°) "A" Band	L9 (osc.) Rock gang
9	Repeat steps 5, 6, 7, and 8.			
10	Ant. terminal in series with 300 ohms	6 mc	6 mc (30°) "B" Band	C11 (osc.)* C19 (det.) C2 (ant.)
11		20 mc	20 mc (23°) "C" Band	C9 (osc.)** C20 (det.) C1 (ant.)

* Use **minimum** capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

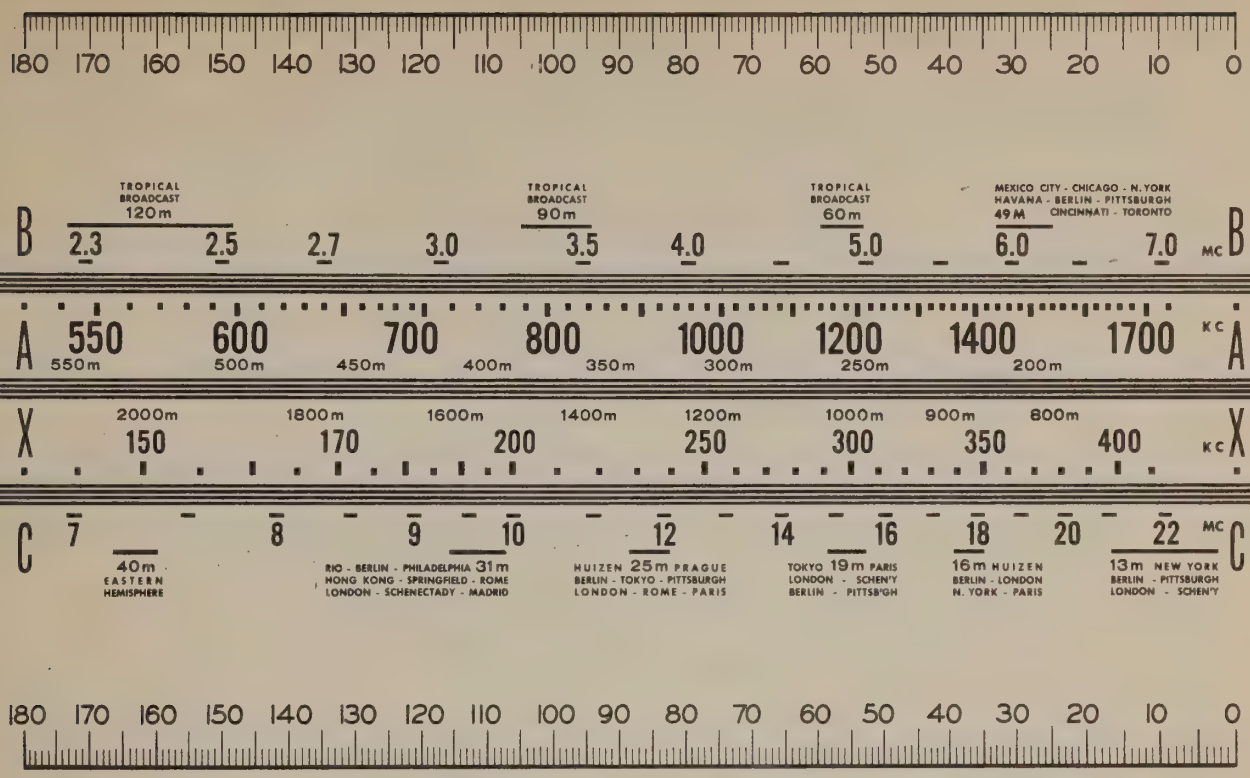
** Use **minimum** capacity peak if two can be obtained. Check to determine that C9 has been adjusted to the correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

† Preset L10 core approximately ½-inch out before adjusting C15.

†† Preset L9 core screw flush with apron before adjusting C12.

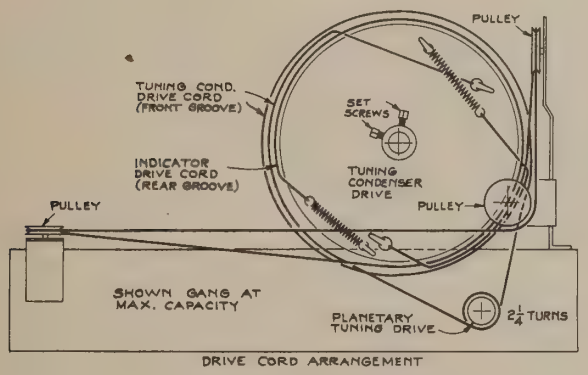
Note.—Oscillator tracks **above** signal on all bands.

Calibration Scale

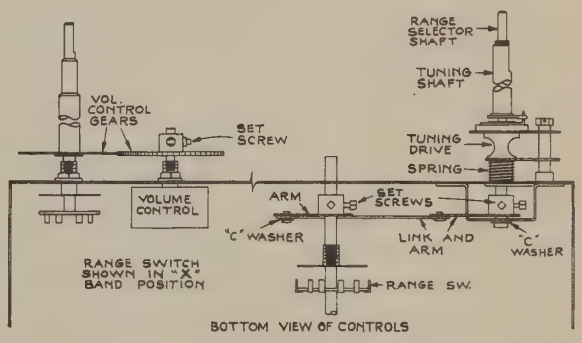

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
TROPICAL BROADCAST 120m
TROPICAL BROADCAST 90m
TROPICAL BROADCAST 60m
MEXICO CITY - CHICAGO - N. YORK HAVANA - BERLIN - PITTSBURGH CINCINNATI - TORONTO 49 M
B 2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 7.0 MC B
A 550 600 700 800 1000 1200 1400 1700 KC A
550m 500m 450m 400m 350m 300m 250m 200m
X 2000m 1800m 1600m 1500m 1400m 1200m 1000m 900m 800m
150 170 200 250 300 350 400 KC X
C 7 8 9 10 12 14 16 18 20 22 MC C
40m EASTERN HEMISPHERE
RIO - BERLIN - PHILADELPHIA 31m HONG KONG - SPRINGFIELD - ROME LONDON - SCHENECTADY - MADRID
HUIZEN 25m PRAGUE BERLIN - TOKYO - PITTSBURGH LONDON - ROME - PARIS
TOKYO 19m PARIS LONDON - SCHEN'Y BERLIN - PITTSB'GH
16m HUIZEN BERLIN - LONDON N. YORK - PARIS
13m NEW YORK BERLIN - PITTSBURGH LONDON - SCHEN'Y
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 28° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."



DRIVE CORD ARRANGEMENT



BOTTOM VIEW OF CONTROLS

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC 441-A)		12896	Capacitor—15 mmfd. (C43)	
			13545	Capacitor—39 mmfd. (C16)	
			12723	Capacitor—56 mmfd. (C24)	
34502	Arm—Operating arm between knob shaft and range switch shaft		12720	Capacitor—100 mmfd. (C42)	
			32239	Capacitor—110 mmfd. (C26)	
10194	Ball—Steel ball		30232	Capacitor—200 mmfd. (C6)	
31767	Board—Antenna-Ground board		12694	Capacitor—220 mmfd. (C5, C17, C22, C32)	
33821	Capacitor—Trimmer capacitor—4 sections, 3 of 2-10 mmfd. and 1 of 3-30 mmfd. (C18, C19, C20, C21)		33760	Capacitor—220 mmfd. (C25, C27, C28)	
			33235	Capacitor—580 mmfd. (C13)	
			12811	Capacitor—3,600 mmfd. (C10)	
12714	Capacitor—Adjustable trimmer—2-12 mmfd. (C9, C11)		31405	Capacitor—6,000 mmfd. (C7)	
			5107	Capacitor—.0025 mfd. (C34, C36)	
33818	Capacitor—Trimmer capacitor—2 sections of 2-20 mmfd. each (C12, C15)		33584	Capacitor—.005 mfd. (C35, C38, C39)	
			32787	Capacitor—.05 mfd. (C30)	
33822	Capacitor—Trimmer capacitor—4 sections, of 3-30 mmfd. each (C1, C2, C3, C44)		4839	Capacitor—0.1 mfd. (C29, C33, C45)	
			33014	Capacitor—Comprising 3 sections of 10 mfd, and 1 section of 20 mfd. (C37, C40, C41, C46)	

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
33762	Coil—Antenna coil A-B-C Band (L1, L2, L3, L4)		31251	Socket—Tube socket	
32823	Coil—Antenna coil X Band (L5, L6)		31418	Spring—Condenser drive cord spring	
33763	Coil—Detector coil A-B-C Band (L11, L12, L13, L14)		13638	Spring—Indicator drive cord spring	
33765	Coil—Detector coil X Band (L15)		33769	Spring—Planetary tuning drive spring	
33764	Coil—Oscillator coil A-B-C Band (L7, L8, L9)		33758	Switch—Range switch (S1, S2, S3, S4, S5, S6)	
32931	Coil—Oscillator coil X Band (L10)		33759	Transformer—First i-f transformer (L16, L17, C25, C26)	
33756	Condenser—Variable tuning condenser (C4, C8, C23)		33761	Transformer—Second i-f transformer (L18, L19, C27, C28, R7)	
33816	Control—Tone control (S7, S8)		31734	Transformer—Power transformer 110 volts, 25 cycle (T1)	
33814	Control—Volume control and power switch (R9, S9)		31733	Transformer—Power transformer 110 volts, 60 cycle (T1)	
32635	Cord—Indicator drive cord		31735	Transformer—Power transformer 105/130-140/160-200/250 volts, 50/60 cycle (T1)	
32713	Core—Core and stud for oscillator coils				
33770	Drive—Planetary tuning drive less balls, shafts, and shaft retainer			SPEAKER ASSEMBLIES (RL 79A-2)	
33773	Drum—Variable tuning condenser drum and hub				
33185	Gear—Gear and hub for volume control and switch		32907	Cap—Dust cap	
			33966	Coil—Field coil (L23)	
33767	Link—Operating link between knob shaft and range switch		32906	Coil—Neutralizing coil (L22)	
12471	Plate—Cushion socket mounting plate assembly less socket		5118	Plug—3 prong male speaker plug	
14281	Resistor—68 ohms, ½ watt (R1, R17)		32905	Transformer—Output transformer (T2)	
31388	Resistor—390 ohms, 1 watt (R10)				
13716	Resistor—2,200 ohms, ½ watt (R8)			MISCELLANEOUS ASSEMBLIES	
33489	Resistor—15,000 ohms 2½ watt (R5)				
13998	Resistor—22,000 ohms, ½ watt (R7)		33799	Dial—Dial scale	
12454	Resistor—33,000 ohms, ½ watt (R3)		34295	Dial—Glass dial scale (Greek)	
17440	Resistor—56,000 ohms, 1 watt (R16)		33797	Frame—Dial frame assembly complete less dial scale	
12285	Resistor—470,000 ohms, ½ watt (R12, R13)				
13730	Resistor—1 meg., ½ watt (R2, R4)				
12679	Resistor—2.2 meg., ½ watt (R6)				
13601	Resistor—10 meg., ½ watt (R11)				
34037	Retainer—Retaining washer for range switch shaft		33774	Mounting—Speaker mounting hardware	
33772	Shaft—Range switch shaft		4982	Spring—Retaining spring for knob Stock No. 34136	
33768	Shaft—Shaft and gear for tone control		14270	Spring—Retaining spring for knob Stock No. 34570	
33771	Shaft—Tuning shaft		34138	Spring—Retaining spring for knob Stock No. 34571	
14278	Socket—Single contact socket and plate for phonograph input				

RCA Victor

MODEL 6Q8

Chassis No. RC-414B

Five-Tube, Three-Band, AC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Long Wave (X)	145-405 kc (2,069-740 m)
Medium Wave (A)	540-1,720 kc (555-174 m)
Short Wave (C)	5.8-18 mc (51.7-16.6 m)

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SA7	Detector-Oscillator
(2) RCA-6K7	I-F Amplifier
(3) RCA-6SQ7	2nd Detector, A.V.C., and A-F Amplifier
(4) RCA-6F6-G	Power Output
(5) RCA-5Y3-G	Rectifier
(6) RCA-6U5/6G5	Tuning Indicator

PILOT LAMP ..... Mazda No. 44, 6.3 volts, 0.25 amp.

POWER OUTPUT RATING

(105-125 Volt Operation)

Undistorted	1.5 watts
Maximum	3.3 watts

LOUDSPEAKER

Type	6-inch electrodynamic
V. C. Impedance	3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles
Rating B	105-125 volts, 25 cycles, 75 watts
Rating C	105-125; 200-250 volts, 50-60 cycles, 75 watts

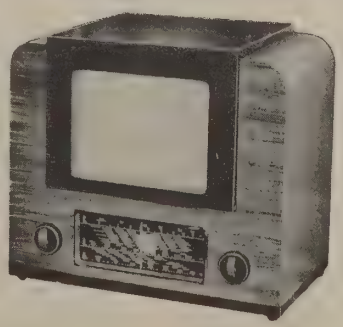
Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	12⅛	14⅛	9
Chassis Base Dimensions (inches)	2¾	12	5¼
Over-all Chassis Height			7⅛ inches
Weight			17½ lbs. (Net)
Tuning Drive Ratio			11 to 1

General Description

Model 6Q8 is a three-band, table-type, superheterodyne receiver housed in a wood cabinet. It is designed to cover the long wave range of 145 to 405 kilocycles, the standard broadcast range of 540 to 1,720 kilocycles, and the short wave range of 5.8 to 18 megacycles.

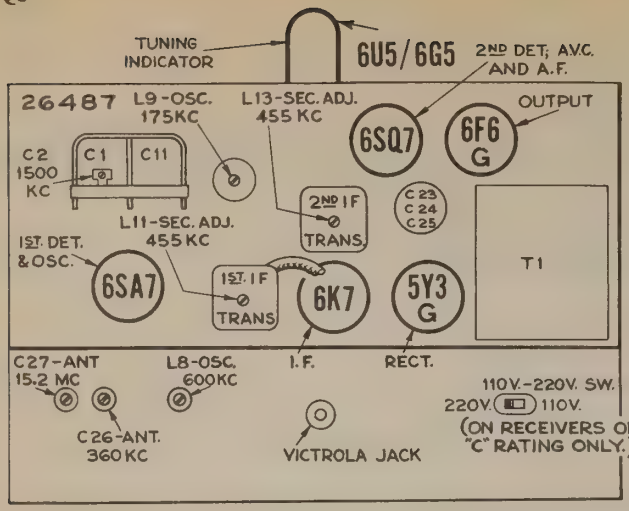
Receivers having "C" power rating may be made to operate on either 110 or 220 volts, conversion from one voltage rating to the other being made by means of a switch at the back of the chassis.

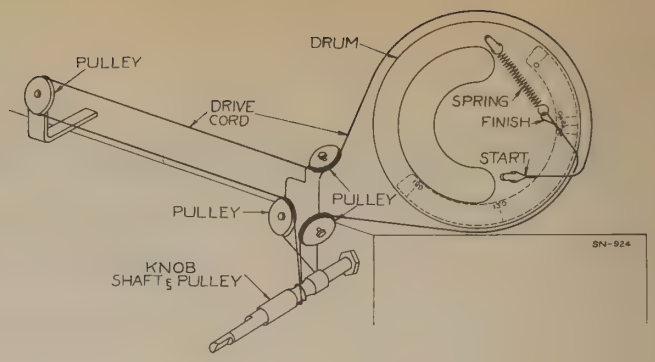


Features of design include: New type, single-ended tubes (6SA7 and 6SQ7); magnetite-core I-F transformers; magnetite-core oscillator coils for "X" and "A" bands; automatic volume control; straight-line, edge-lighted dial; super-sensitive dynamic speaker; supply-voltage change-over switch (on "C" rating receivers); continuously variable tone control.

First Edition

Printed in U. S. A.





Arrangement of Drive Cords for Tuning Condenser and Dial Indicator

At Left—Tube and Trimmer Locations

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

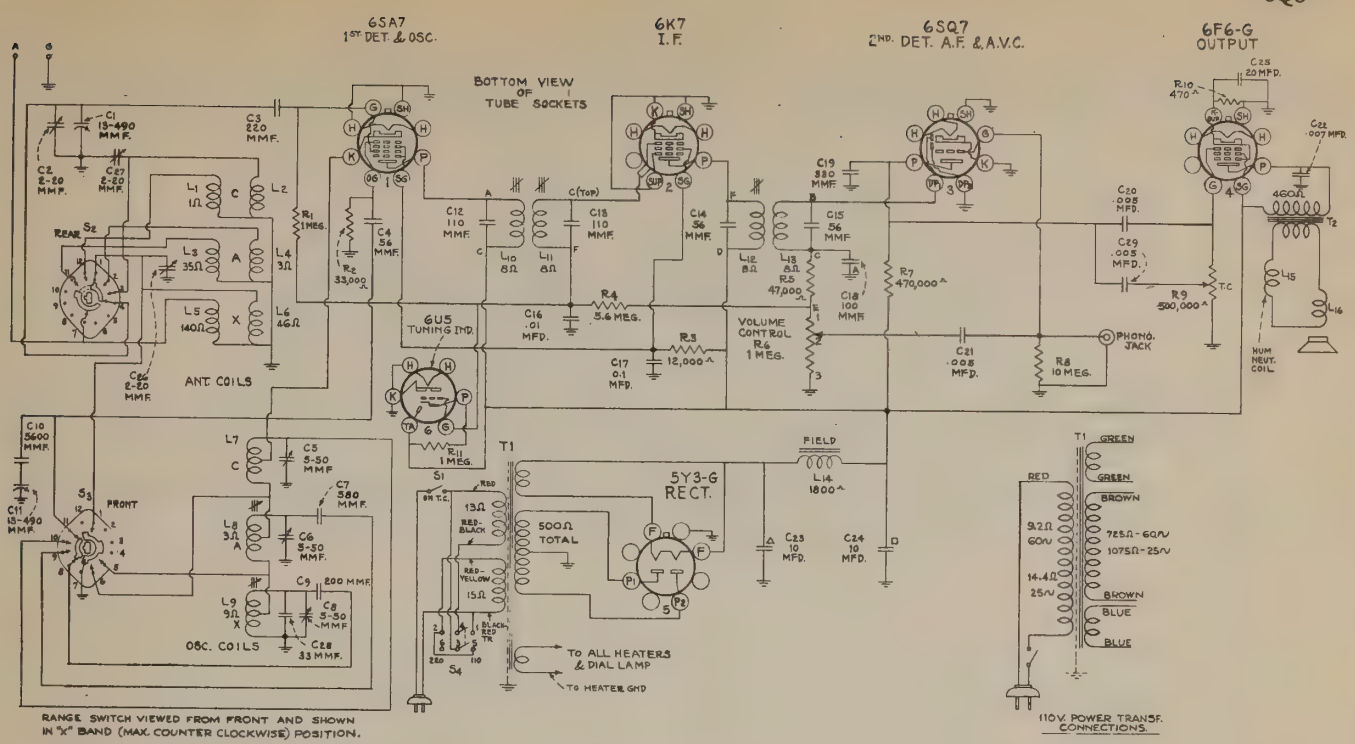
As the first step in r-f alignment, check the position of the drum. The 135° mark on the drum scale must be vertical, and directly under the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of one set screw, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap in series with .01 mfd.	455 kc	"A" Band Quiet Point between 550-750 kc	L12 and L13 (2nd I-F Trans.)
2	6SA7 det. grid in series with .01 mfd.	455 kc		L10 and L11 (1st I-F Trans.)
3	Ant. terminal in series with 200 mmf.	1,500 kc	1,500 kc (152.4°) "A" Band	C6 (osc.) C2 (ant.)
4	Ant. terminal in series with 200 mmf.	600 kc	600 kc (33°) "A" Band	L8 (osc.) Rock Gang
5	Repeat steps 3 and 4			
6	Ant. terminal in series with 200 mmf.	360 kc	360 kc (151.5°) "X" Band	C8 (osc.) C26 (ant.)
7	Ant. terminal in series with 200 mmf.	175 kc	175 kc (53.3°) "X" Band	L9 (osc.) Rock Gang
8	Repeat steps 6 and 7			
9	Ant. terminal in series with 300 ohms	15.2 mc	15.2 mc (147.2°) "C" Band	C5 (osc.)* C27 (ant.)
10	Ant. terminal in series with 200 mmf.	360 kc	360 kc (151.5°) "X" Band	C8 (osc.)
11	Ant. terminal in series with 200 mmf.	1,500 kc	1,500 kc (152.4°) "A" Band	C6 (osc.)

*Use minimum capacity peak if two can be obtained. Check to determine that C5 is adjusted to correct peak by tuning receiver to approximately 14.29 mc where a weaker signal should be received.

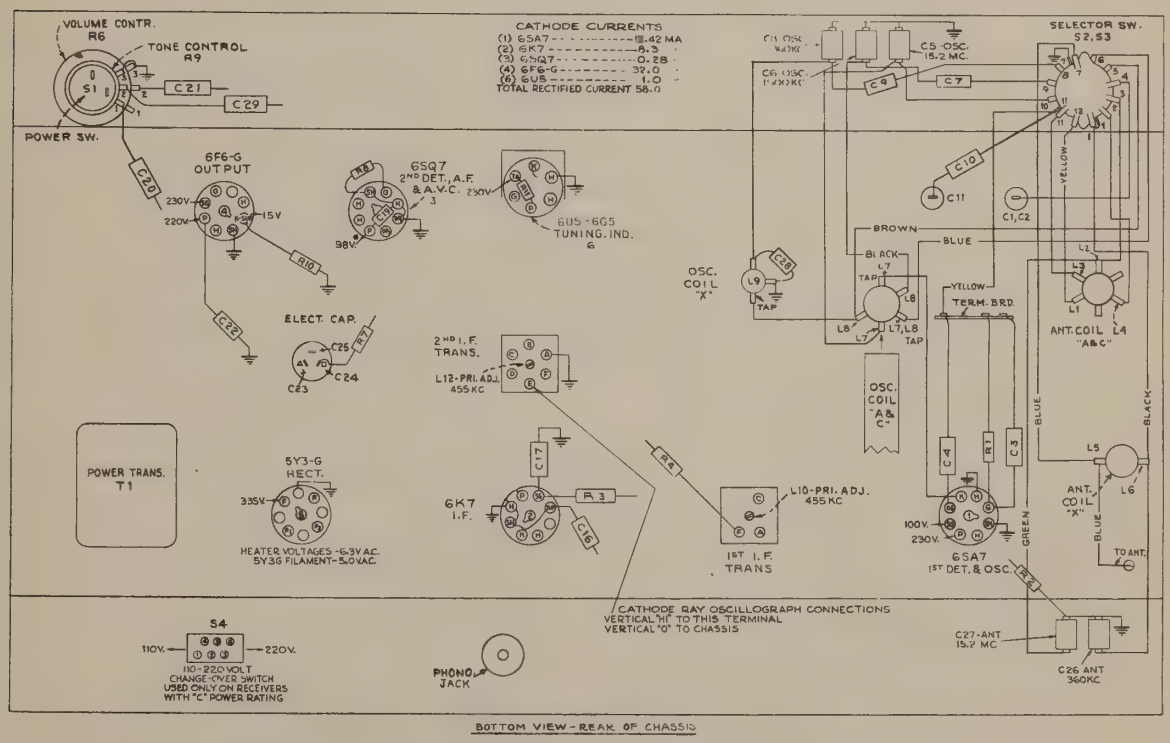
NOTE: Oscillator tracks above signal on all bands.



Schematic Circuit Diagram

Precautionary Lead Dress:

1. Lead from 2nd I-F transformer to volume control should be kept close to the chassis and dressed against front apron.
2. C-10 should be dressed away from the antenna section of the variable condenser (C-1).

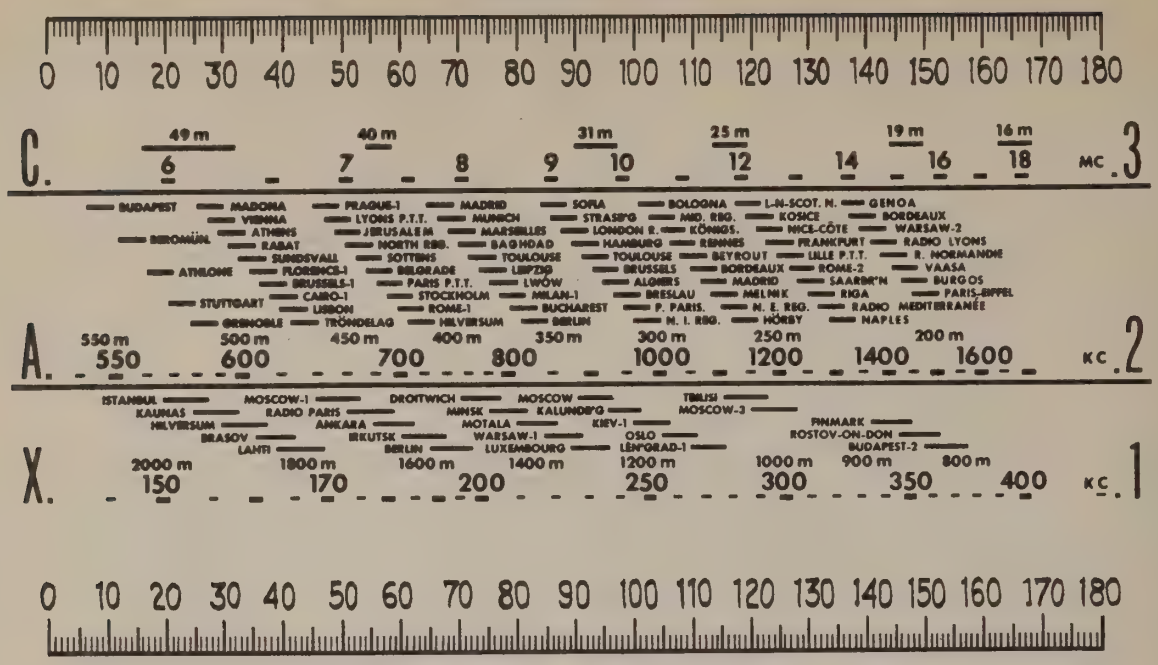


R-F Wiring Diagram and Socket Voltages

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ±20% with 117-volt a-c supply.

* **NOTE:** Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.

Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
C.
49 m 40 m 31 m 25 m 19 m 16 m
6 7 8 9 10 12 14 16 18 MC. 3
BUDAPEST MADONA PRAGUE-1 MADRID SOFIA BOLOGNA L-N-SCOT. N. GENOA
VIENNA LYONS P.T.T. MUNICH STRASB'G MID. REG. KOSICE BORDEAUX
ATHENS JERUSALEM MARSEILLES LONDON R. KÖNIGS. NICE-CÔTE WARSAW-2
BIROMÜN RABAT NORTH REG. BAGHDAD HAMBURG RENNES FRANKFURT RADIO LYONS
SUNDSVALL SOTTENS TOULOUSE TOULOUSE BEYROUT LILLE P.T.T. R. NORMANDIE
ATHLONE FLORENCE-1 BELGRADE LEIPZIG BRUSSELS BORDEAUX ROME-2 VAASA
BRUSSELS-1 PARIS P.T.T. LWÓW ALGIERS MADRID SAARBR'N BURGOS
STUTTGART CAIRO-1 STOCKHOLM MILAN-1 BRESLAU MELNIK RIGA PARIS-EIFFEL
LISBON ROME-1 BUCHAREST P. PARIS. N. E. REG. RADIO MEDITERRANÉE
GRENOBLE TRÖNDELAG HILVERSUM BERLIN M. I. REG. HÖRBY NAPLES
A.
550 m 500 m 450 m 400 m 350 m 300 m 250 m 200 m
550 600 700 800 1000 1200 1400 1600 KC. 2
ISTANBUL MOSCOW-1 DROITWICH MOSCOW TBILISI
KAUNAS RADIO PARIS MINSK KALUNDB'G MOSCOW-3
HILVERSUM ANKARA MOTALA KIEV-1 FINMARK
BRASOV IRKUTSK WARSAW-1 OSLO ROSTOV-ON-DON
LAHTI BERLIN LUXEMBOURG LENGRAD-1 BUDAPEST-2
X.
2000 m 1800 m 1600 m 1400 m 1200 m 1000 m 900 m 800 m
150 170 200 250 300 350 400 KC. 1
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 33° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC—414—B)
32830	Capacitor—2-gang trimmer, each section 2-20 mmfd. (C26, C27)
32829	Capacitor—3-gang trimmer, each section 5-60 mmfd. (C5, C6, C8)
12948	Capacitor—33 mmfd. (C28)
30949	Capacitor—56 mmfd. (C14, C15)
12723	Capacitor—56 mmfd. (C4)
14262	Capacitor—109 mmfd. (C12, C13)
32238	Capacitor—110 mmfd. (C18)
30232	Capacitor—200 mmfd. (C9)
12694	Capacitor—220 mmfd. (C3)
12952	Capacitor—330 mmfd. (C19)
32853	Capacitor—580 mmfd. (C7)
13895	Capacitor—5600 mmfd. (C10)
4838	Capacitor—.005 mfd. (C20, C21, C29)
5148	Capacitor—.007 mfd. (C22)
14393	Capacitor—.01 mfd. (C16)
4839	Capacitor—0.1 mfd. (C17)
32240	Capacitor—Electrolytic, 2 sections 10 mfd., one section 20 mfd. (C23, C24, C25)
32822	Coil—Antenna coil—A,C bands (L1, L2, L3, L4)
32823	Coil—Antenna coil—X band (L5, L6)
32707	Coil—Oscillator coil—A,C bands (L7, L8)
32931	Coil—Oscillator coil—X band (L9)
32817	Condenser—2-gang variable (C1, C2, C11)
32634	Cord—Drive cord
32713	Core—Adjustable core and stud assembly for oscillator coil
32838	Dial—Glass dial scale
32835	Drum—Variable condenser drive drum complete
11891	Lamp—Dial lamp
32953	Plate—Dial back plate and pointer—less dial scale
5119	Plug—3-contact female for speaker cable
32834	Pulley—Drive cord pulley and mounting bracket (1 pulley)
32951	Pulley—Drive cord pulleys and mtg. bracket (3 pulleys)
30681	Resistor—470 ohms, 1 watt (R10)
31389	Resistor—12,000 ohms, 3½ watts (R3)
12454	Resistor—33,000 ohms, ½ watt (R2)
5132	Resistor—47,000 ohms, 1/10 watt (R5)
12285	Resistor—470,000 ohms, ½ watt (R7)
12013	Resistor—1 meg., 1/10 watt (R11)
13730	Resistor—1 meg., ½ watt (R1)
11668	Resistor—5.6 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R8)
14343	Retainer—Retaining ring for holding tuning knob shaft
32932	Shaft—Tuning knob shaft
31365	Socket—Dial lamp socket
32950	Socket—Magic Eye socket and bracket
31251	Socket—Octal base tube socket
14278	Socket—Phonograph input socket
31418	Spring—Tension spring for drive cord
32930	Switch—Range switch
32827	Switch—Voltage changeover switch (S4)
14376	Transformer—First i. f. transformer (L10, L11, C12, C13)
32825	Transformer—Second i. f. transformer (R5, L12, L13, C14, C15, C18)
32910	Transformer—Power transformer 105-120 volts, 25-50 cycles (T1)
32911	Transformer—Power transformer 105-120 volts, 50-60 cycles (T1)
32852	Transformer—Power transformer 105-120, and 200-240 volts, 50-60 cycles (T1)
32928	Volume control and power switch (R6, S1)
	SPEAKER ASSEMBLIES (RL—79—2)
32907	Cap—Speaker cone center dust cap
32903	Coil—Speaker field coil (L14)
32906	Coil—Speaker hum neutralizing coil (L15)
5118	Plug—3-prong male for speaker
32933	Speaker complete
32905	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
32838	Dial—Dial scale and crystal
32937	Knob—Range switch knob (small)
33029	Knob—Tone control and switch knob (small)
32935	Knob—Tuning knob (large)
32936	Knob—Volume control knob (large)
4982	Spring—Retaining spring for knob Stk. 32935
14270	Spring—Retaining spring for knob Stk. Nos. 32936 or 32937
30330	Spring—Retaining spring for knob Stk. 33029.

RCA Victor

MODELS 7Q4 and 7QK4

Chassis No. RC-478A RC-478B

(See service note on Model 6Q4 for Alignment Data, Schematic Diagram, etc.)

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

TUBE COMPLEMENT

(1) RCA-6SK7..... R-F Amplifier
(2) RCA-6SA7..... 1st Detector-Oscillator
(3) RCA-6SK7..... I-F Amplifier
(4) RCA-6SQ7.. 2nd Detector, A.V.C., and A-F Amplifier
(5) RCA-6F6-G (7Q4) } ..... Output
RCA-6F6 (7QK4) }
(6) RCA-5Y3-G..... Rectifier
(7) RCA-6U5/6G5..... Tuning Indicator

LOUDSPEAKERS

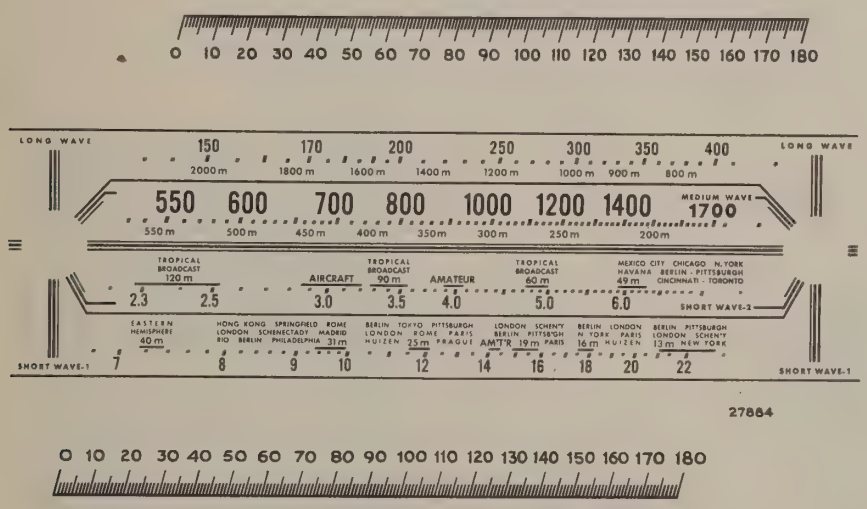
7Q4 (RL-63K-2) ..... 8-inch electrodynamic
7QK4 (RL-70J-4) ..... 12-inch electrodynamic
V. C. Impedance..... 2.2 ohms at 400 cycles

CABINET DIMENSIONS

7Q4..... 15 9/16-inches x 20 5/8-inches x 9 7/8-inches
7QK4..... 38-inches x 26-inches x 11 3/4-inches

Models 7Q4 and 7QK4 are similar to Model 6Q4 except for the addition of a tuning indicator (RCA-6U5/6G5). The 7QK4 chassis uses an RCA-6F6 output tube, whereas the 7Q4 uses an RCA-6F6-G output tube.

The dial scale of Models 7Q4 and 7QK4, together with a table giving alignment frequencies and calibration degrees, is show below. For additional alignment data, schematic diagram, etc., refer to the service note on Model 6Q4.



Calibration Scale

Frequency	Calibration Degrees
175 kc.....	52.8
360 kc.....	148.5
600 kc.....	32.0
1,500 kc.....	152.0
6.0 mc.....	150.0
20.0 mc.....	157.0

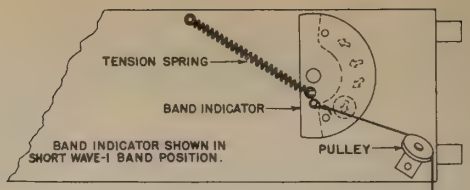
The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale.

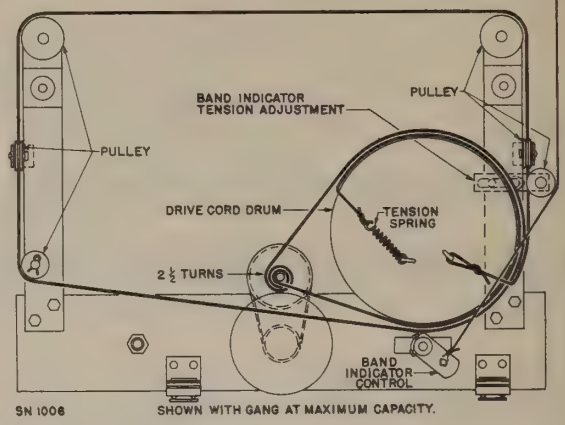
Replacement Parts

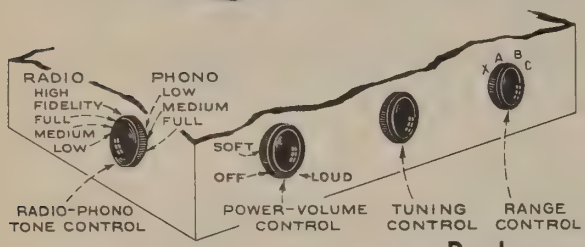
Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES		13545	Capacitor—39 mmfd. (C16)	
34401	Arm—Arm and hub for band indicator less cable—fastens on range switch shaft.....		12723	Capacitor—56 mmfd. (C24)	
			12720	Capacitor—100 mmfd. (C42)	
34400	Belt—Drive belt		32239	Capacitor—110 mmfd. (C26)	
31767	Board—"Ant-Gnd" terminal board		30232	Capacitor—200 mmfd. (C6)	
32635	Cable—Cable and clips for band indicator.....		12694	Capacitor—220 mmfd. (C5, C17, C22, C32)...	
33821	Capacitor—Mica trimmer—3 sections 2-10 mmfd. and 1 section 3-30 mmfd. (C18, C19, C20, C21)		33760	Capacitor—220 mmfd. (C25, C27, C28).....	
			33235	Capacitor—580 mmfd. (C13).....	
			12811	Capacitor—3,600 mmfd. (C10)	
12714	Capacitor—Air trimmer, 2-12 mmfd. (C9, C11)		31405	Capacitor—6,000 mmfd. (C7)	
33818	Capacitor—Mica trimmer, 2 sections 2-20 mmfd. each (C12, C15)		5107	Capacitor—.0025 mfd. (C34, C36)	
			4838	Capacitor—.005 mfd. (C38, C39, C35)	
12896	Capacitor—15 mmfd. (C43)		32787	Capacitor—.05 mfd. (C30)	
33822	Capacitor—Mica trimmer, 4 sections 3-30 mmfd. each (C1, C2, C3, C44)		4839	Capacitor—0.1 mfd. (C29, C33, C45)	
			33014	Capacitor—Electrolytic—3 sections 10 mfd. and 1 section 20 mfd. (C37, C40, C41)	

Above—Model 7Q4
At Left—Model 7QK4
At Right—Dial Drive Mechanism and Band Indicator
Below—Controls







Replacement Parts (Continued)

STOCK No.	DESCRIPTION
33762	Coil—Antenna coil A-B-C Bands (L1, L2, L3, L4)
32823	Coil—Antenna coil X Band (L5, L6)
33763	Coil—Detector coil A-B-C Bands (L11, L12, L13, L14)
33765	Coil—Detector coil X Band (L15)
33764	Coil—Oscillator coil A-B-C Bands (L7, L8, L9)
32931	Coil—Oscillator coil X Band (L10)
33756	Condenser—3 gang variable tuning condenser (C4, C8, C23)
34403	Control—Tone control
34662	Cord—Pointer drive cord
32713	Core—Adjustable core and stud for A-B-C Band Coil
34392	Drum—Variable condenser drive drum
11891	Lamp—Dial lamp
14028	Nut—Clamping nut for air trimmer
31817	Plate—Cushion socket mounting plate less socket
5119	Plug—3 contact female plug for speaker cable
12493	Plug—5 contact female plug for speaker cable
34399	Pulley—Drive belt pulley and set screws for tuning knob shaft
34398	Pulley—Drive belt pulley and set screws for intermediate drive shaft
31373	Pulley—Drive cord pulley for L. H. support
34402	Pulley—Drive cord pulley and bracket for R. H. support
34394	Pulley—L. H. support and drive cord pulleys (2) assembled, less loose pulley
34404	Pulley—L. H. support and drive cord pulleys (3) assembled (Model 7QK4)
34395	Pulley—R. H. support and drive cord pulleys (2) assembled, less loose pulley and bracket
34405	Pulley—R. H. support and drive cord pulleys (3) assembled (Model 7QK4)
14281	Resistor—68 ohm, ½ watt (R1, R17)
31388	Resistor—390 ohms, 1 watt (R10)
13716	Resistor—2,200 ohms, ½ watt (R8)
33489	Resistor—15,000 ohms, 2½ watt (R5)
13998	Resistor—22,000 ohms, ½ watt (R7)
12454	Resistor—33,000 ohms, ½ watt (R3)
17440	Resistor—56,000 ohms, 1 watt (R16)
12285	Resistor—470,000 ohms, ½ watt (R12, R13)
12013	Resistor—1 megohm, 1/10 watt
13730	Resistor—1 megohm, ½ watt (R2, R4)
12679	Resistor—2.2 megohm, ½ watt (R6)
13601	Resistor—10 megohm, ½ watt (R11)
30340	Retainer—Retaining clip for pulley Stock No. 31373
34396	Shaft—Intermediate tuning drive shaft, and drive cord pulley less drive belt, pulley and set screws
34397	Shaft—Intermediate tuning drive shaft, and flywheel—less drive belt pulley and set screws
31364	Socket—Dial lamp socket
34864	Socket—Magic Eye socket
14278	Socket—Phono. input socket
31251	Socket—Tube socket
31418	Spring—Pointer drive cord tension spring
34390	Switch—Range switch (S1, S2, S3, S4, S5, S6)
33759	Transformer—First i.f. transformer (L16, L17, L20, C25, C26)
33761	Transformer—Second i.f. transformer (L18, L19, C27, C28, C31, R7)
31735	Transformer—Power transformer—105/130, 140/160, 195/250 volts, 50/60 cycles
34389	Volume control—Volume control and power switch (R9, S9)
33726	Washer—"C" washer for tuning shaft

SPEAKER ASSEMBLIES (RL 63K2) MODEL 7Q4

31825	Cap—Dust cap
34615	Cone—Cone complete with voice coil
5118	Plug—3 contact male plug for speaker
34614	Speaker—Speaker complete with cone less output transformer and plug
14355	Transformer—Output transformer

SPEAKER ASSEMBLIES (RL 70J4) MODEL 7QK4

31825	Cap—Speaker cone dust cap
33116	Coil—Speaker field coil
11469	Coil—Speaker hum neutralizing coil
31275	Cone—Cone and voice coil assembly
5118	Plug—3 prong male speaker plug
14355	Transformer—Output transformer

MISCELLANEOUS ASSEMBLIES

MI 8105	Adapter—European adapter for power cord
30766	Cap—"Magic Eye" rubber cap
30716	Clip—"Magic Eye" clip
34486	Dial—Glass dial scale (English)
34504	Dial—Glass dial scale (Greek)
34485	Frame—Dial frame complete with brackets and pulleys less dial, indicator pointer, pointer rods, band indicator, band indicator spring and Magic Eye clip
34488	Indicator—Band indicator
34487	Indicator—Station selector indicator pointer
34494	Knob—Tone control knob
34489	Knob—Tuning range switch or volume control and power switch knob
31482	Screw—No. 8-32 square head set screw for shafts Stock No. 34492, 34493
33438	Screw—Magic Eye clip screw
34491	Shaft—Indicator pointer guide shaft
34492	Shaft—Tone control extension shaft (Model 7Q4)
34493	Shaft—Tone control extension shaft (Model 7QK4)
30756	Spring—Band indicator spring
4982	Spring—Retaining spring for knob Stock No. 34494, 34489
33726	Washer—Band indicator retaining washer

RCA Victor

Models 9Q1 and 9QK

Chassis No. RC-444 and 444A

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast ("A" Band)	540-1,720 kc (556-174 m)
Medium Wave ("B" Band)	3.0 -9.5 mc (100-31.6 m)
31 Meter Spread Band	9.5 -11.7 mc (31.6-25.6 m)
25 Meter Spread Band	11.7-15.1 mc (25.6-19.9 m)
19 Meter Spread Band	15.1-17.75 mc (19.9-16.9 m)
16 Meter Spread Band	17.75-18.1 mc (16.9-16.6 m)
13 Meter Spread Band	21.42-22.4 mc (14.0-13.4 m)

INTERMEDIATE FREQUENCY ..... 455 kc

POWER SUPPLY RATINGS

Symbol	Voltage	Frequency (cycles)	Watts
Rating A	105-125	50-60	100
Rating B	105-125	25-60	100
Rating C*	100-130, 140-160, 195-250	40-60	100

TUBE COMPLEMENT

(1) RCA-6SK7	R-F Amplifier
(2) RCA-6SA7	1st Detector
(3) RCA-6SA7	Oscillator
(4) RCA-6B8	I-F Amplifier, 2nd Det., A.V.C.
(5) RCA-6SC7	A-F Amplifier, Phase Inverter
(6) RCA-6F6-G	Power Output
(7) RCA-6F6-G	Power Output
(8) RCA-6U5/6G5	Tuning Indicator
(9) RCA-5Y3-G	Rectifier

LOUDSPEAKER	9Q1	9QK
Model	(RL-63K-5)	(RL-70J-3)
Type	8-inch Electrodynamic	12-inch Electrodynamic
V.C. Impedance at 400 C.P.S.	2.2 ohms	2.2 ohms
PILOT LAMPS (3)	Mazda 51, 7.5 volts, 0.2 amp.	

POWER OUTPUT RATING

Undistorted	4.5 watts
Maximum	5 watts

Model 9QK

Model 9Q1

Mechanical Specifications

	9Q1	9QK
Height (inches)	13 1/8	38
Width (inches)	20	26
Depth (inches)	11 7/8	11 3/4
Weight (Net lbs.)	36	60
Chassis Base Dimensions (inches)	3 1/8 x 15 5/8 x 9	
Over-all Chassis Height (inches)		9 5/8
Tuning Drive Ratio		25 to 1

First Edition

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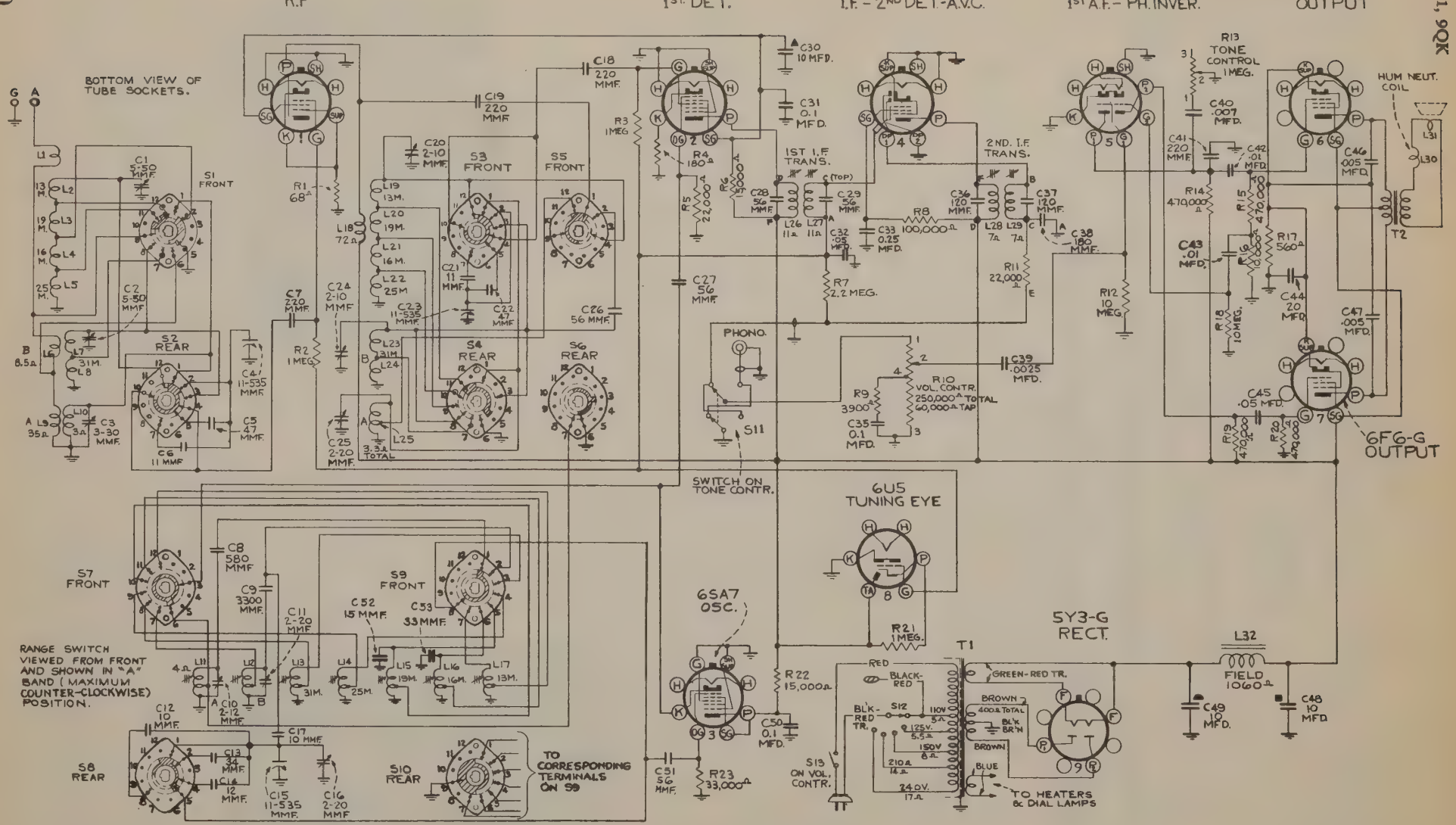
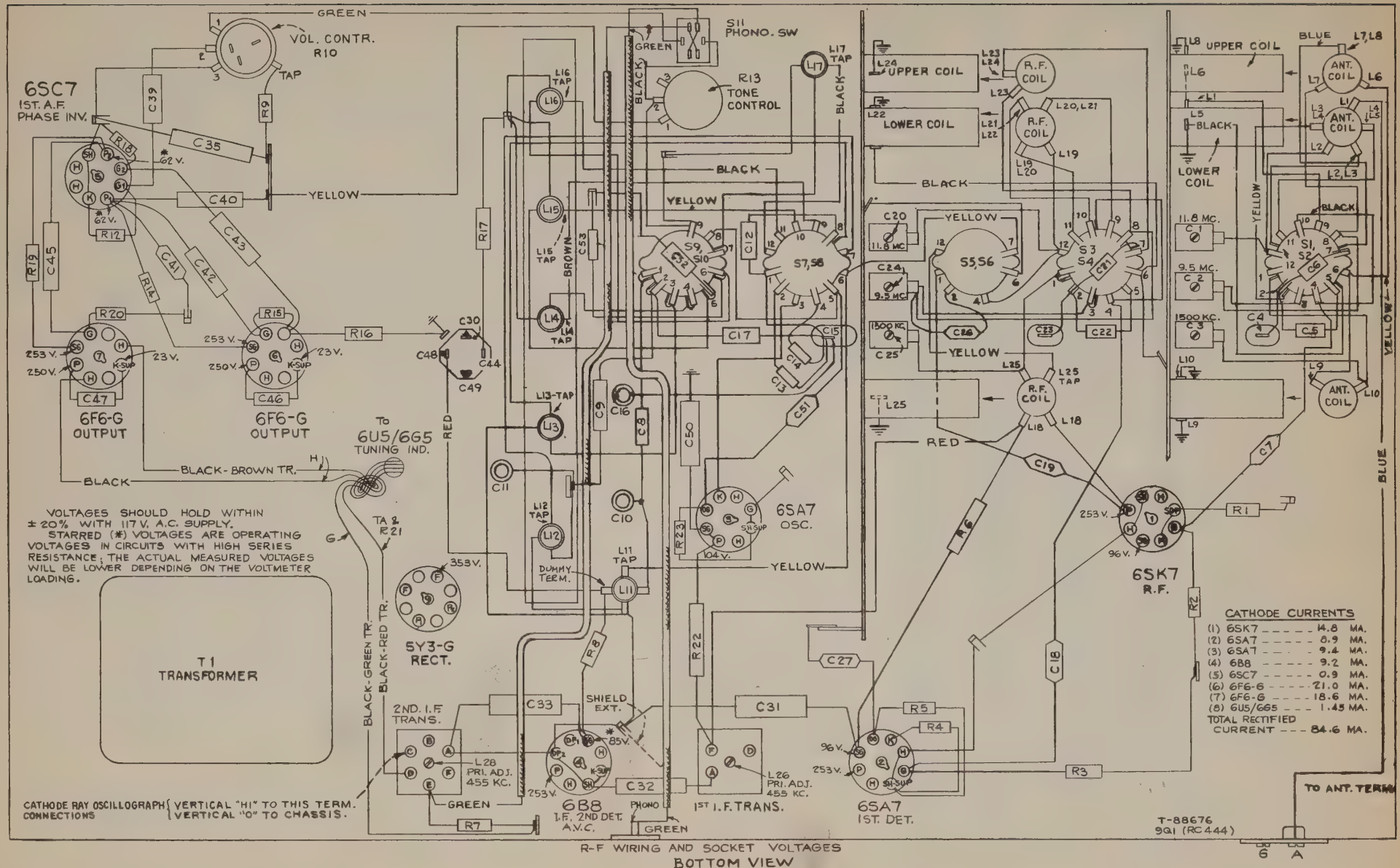
Printed in U. S. A.



Schematic Circuit Diagram

Precautionary Lead Dress.—

1. C-39 must be pushed downward as close to the chassis and front apron as possible.
2. The power cord leads must be pushed as far away from C-39 and the 6SC7 and 6F6G sockets as possible, preferably toward the center of the chassis.
3. Dress the green lead from the volume control to the phono. switch directly against the front apron for its entire length.



R-F WIRING AND SOCKET VOLTAGES

BOTTOM VIEW

ALIGNMENT PROCEDURE

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the indicator-drive-cord drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The "0" mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

To determine the corresponding frequency for any setting of the calbration scales, refer to the accompanying drawing which shows the dial with 0-180° calibration scales drawn at top and bottom.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "0" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

Spread-Band Alignment.—The most satisfactory method of aligning or checking the spread-band ranges is on actual reception of short-wave stations of known frequency, by adjusting the magnetite-core oscillator coil for each band so that these stations come in at the correct points on the dial.

In exceptional cases, when the set is being serviced in a location where the noise level is high enough to prevent reception of short-wave stations, a test-oscillator may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the test-oscillator, as a slight error will produce considerable inaccuracy on the spread-band dials. The frequency settings of the test-oscillator may be checked by one or both of the following methods:

1. Determine the exact dial settings of the test-oscillator (for frequencies at or close to the specified alignment frequencies) by zero-beating the test-oscillator against short-wave stations of known frequency.
2. Use harmonics of the standard-broadcast range of a test-oscillator, first checking the frequency settings on this range by means of a crystal calibrator (RCA Stock No. 9572), or by zero-beating against standard broadcast stations.

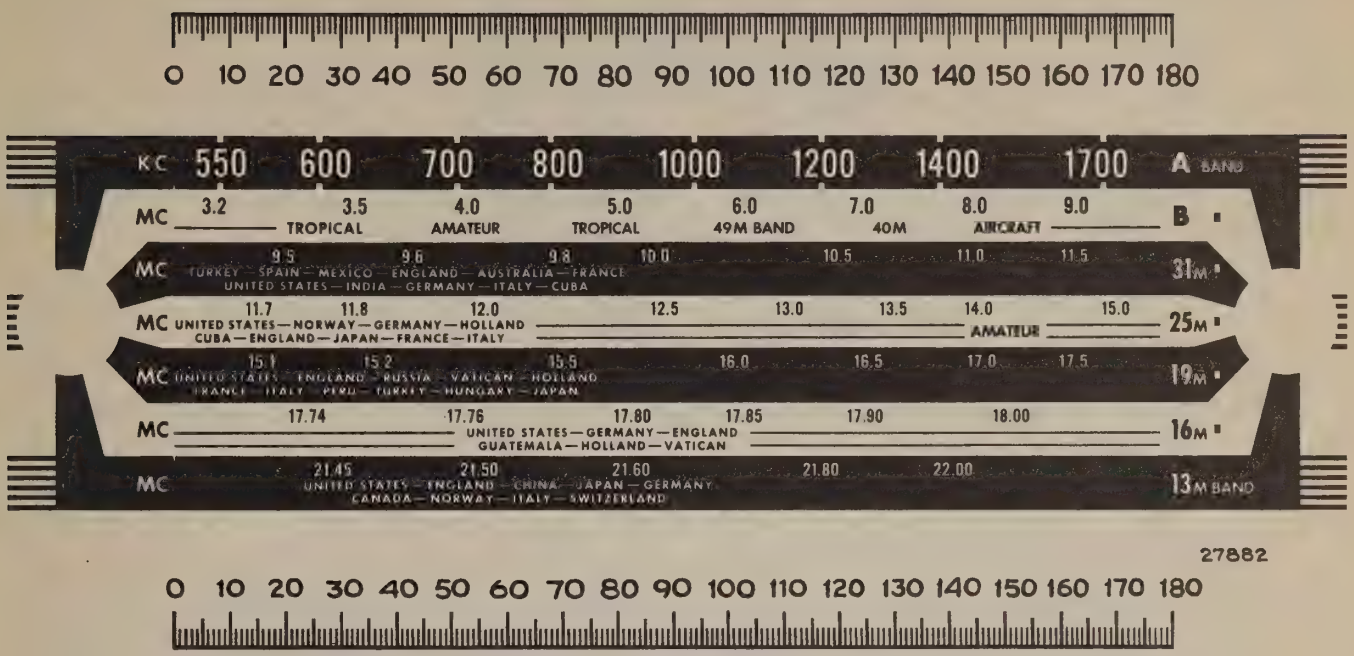
When a test oscillator is employed for spread-band alignment, a final check should be made on actual reception of short-wave stations of known frequency, and the magnetite-core oscillator coil for each band should be re-adjusted so that the stations come in at the correct points on the dial.

For additional information, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Range switch	Turn radio dial to—	Adjust the following for max. peak output
1	6B8 I-F Grid in series with .01 mfd.	455 kc	A	Quiet Point Near 0°	L29 and L28 (2nd I.F. Trans.)
2	6SA7 1st Detector Grid in series with .01 mfd.				L27 and L26 (1st I.F. Trans.)
3	Antenna Terminal in series with 300 ohms	9.5 mc	31M	20°	L13 (osc.)* C24 (det.)† C2 (ant.)
4		11.7 mc		171°	C16 (osc.)*
4A		Check to determine that C16 has been adjusted to the correct peak by turning radio to 10.8 mc (141°) where a weaker signal should be received.			
5		9.5 mc	B	180°	C11 (osc.)*
5A		Check to determine that C11 has been adjusted to the correct peak by turning radio to 8.6 mc (156°) where a weaker signal should be received.			
6		3.0 mc	B	0°	L12 (osc.)* (Rock Gang)
7	Antenna Terminal in series with 200 mmf.	1,500 kc	A	149°	C10 (osc.) C3 (ant.) C25 (det.)
8		600 kc		27°	L11 (osc.) (Rock Gang)
8A		Repeat steps 7 and 8.			
9	Antenna Terminal in series with 300 ohms	11.8 mc	25M	33°	L14 (osc.)* C20 (det.)† C1 (ant.)
10		15.2 mc	19M	37°	L15 (osc.)*
11		17.75 mc	16M	40°	L16 (osc.)**
12		21.5 mc	13M	55°	L17 (osc.)**

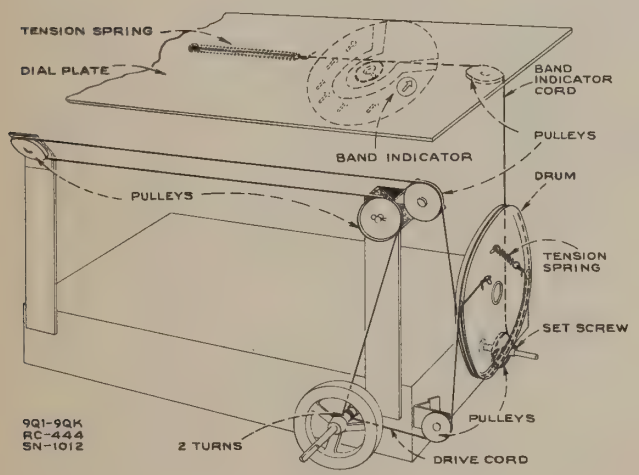
* Use peak with plunger out if two peaks can be obtained.
** Use peak with plunger in if two peaks can be obtained.
† Rock gang condenser slightly while peaking. Use maximum capacity peak if two peaks can be obtained.
Note: Oscillator tracks **above** signal on A, B, 31M, 25M and 19M bands; **below** signal on 16M and 13M bands.

Calibration Scale

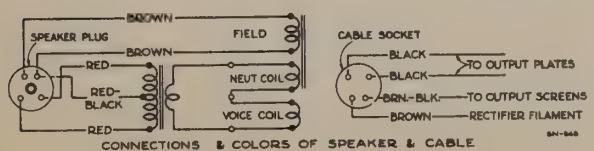

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
KC 550 600 700 800 1000 1200 1400 1700 A BAND
MC 3.2 3.5 4.0 5.0 6.0 7.0 8.0 9.0 B
TROPICAL AMATEUR TROPICAL 49M BAND 40M AIRCRAFT
MC 9.5 9.6 9.8 10.0 10.5 11.0 11.5 31M
TURKEY—SPAIN—MEXICO—ENGLAND—AUSTRALIA—FRANCE
UNITED STATES—INDIA—GERMANY—ITALY—CUBA
MC 11.7 11.8 12.0 12.5 13.0 13.5 14.0 15.0 25M
UNITED STATES—NORWAY—GERMANY—HOLLAND
CUBA—ENGLAND—JAPAN—FRANCE—ITALY
AMATEUR
MC 15.1 15.2 15.5 16.0 16.5 17.0 17.5 19M
UNITED STATES—ENGLAND—RUSSIA—VATICAN—HOLLAND
FRANCE—ITALY—PERU—TURKEY—HUNGARY—JAPAN
MC 17.74 17.76 17.80 17.85 17.90 18.00 16M
UNITED STATES—GERMANY—ENGLAND
GUATEMALA—HOLLAND—VATICAN
MC 21.45 21.50 21.60 21.80 22.00 13M BAND
UNITED STATES—ENGLAND—CHINA—JAPAN—GERMANY
CANADA—NORWAY—ITALY—SWITZERLAND
27882
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

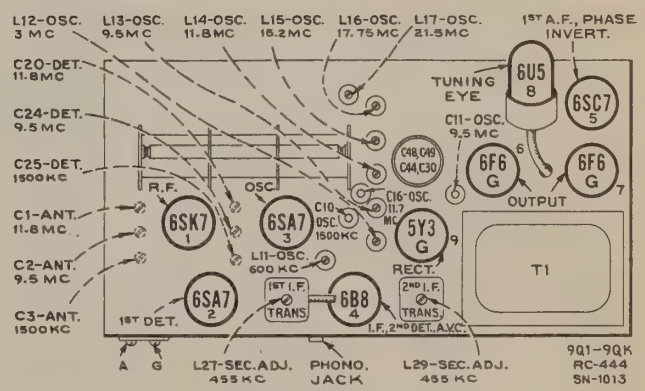
Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 149° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."

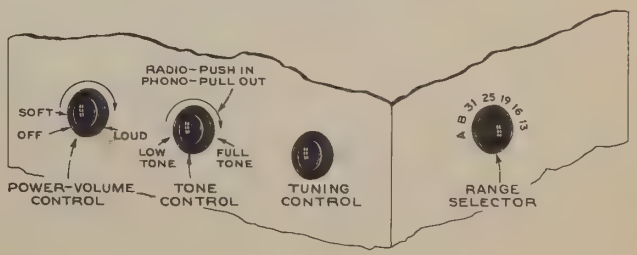


Drive Cord and Band Indicator Arrangement





Tube and Trimmer Locations



Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
14517	Board—"Antenna-Ground" board
34665	Bracket—Drive cord bracket and pulley—long bracket with one pulley
34660	Bracket—Drive cord bracket and pulley—short bracket with one pulley
34656	Bracket—Drive cord bracket and pulleys—long bracket with two pulleys
12714	Capacitor—Air trimmer—2-12 mmfd. (C10)
12884	Capacitor—Air trimmer—long—2-20 mmfd. (C11, C16)
34654	Capacitor—Trimmer comprising 2 sections of 2.5-10 mmfd. and 1 section of 2.5-20 mmfd. (C20, C24, C25)
34653	Capacitor—Trimmer comprising 2 sections of 5-50 mmfd. and 1 section of 3-30 mmfd. (C1, C2, C3)
13200	Capacitor—10 mmfd. (C12, C17)
34668	Capacitor—11 mmfd. (C6, C21)
33380	Capacitor—12 mmfd. (C14)
12896	Capacitor—15 mmfd. (C52)
12948	Capacitor—33 mmfd. (C53)
34670	Capacitor—34 mmfd. (C13)
13141	Capacitor—47 mmfd. (C5, C22)
12723	Capacitor—56 mmfd. (C26, C27, C51)
30949	Capacitor—56 mmfd. (C28, C29)
31813	Capacitor—120 mmfd. (C36, C37)
14712	Capacitor—180 mmfd. (C38)
12694	Capacitor—220 mmfd. (C7, C18, C19, C41)
33235	Capacitor—580 mmfd. (C8)
31403	Capacitor—3,300 mmfd. (C9)
34459	Capacitor—.0025 mfd. (C39)
33584	Capacitor—.005 mfd. (C46, C47)
5148	Capacitor—.007 mfd. (C40)
4937	Capacitor—.01 mfd. (C42, C43)
32787	Capacitor—.05 mfd. (C32, C45)
4839	Capacitor—0.1 mfd. (C31, C35, C50)
12484	Capacitor—0.25 mfd. (C33)
33014	Capacitor—Electrolytic comprising 3 sections of 10 mfd. and 1 section of 20 mfd. (C30, C44, C48, C49)
31782	Coil—Oscillator coil for "A" band
34659	Coil—Oscillator coil for "B" band and 31 meter bands
34661	Coil—Oscillator coil for 13 meter band
34657	Coil—Oscillator coil for 16 meter and 19 meter bands
34658	Coil—Oscillator coil for 25 meter band
34645	Condenser—Variable tuning condenser
34666	Control—Tone control
34667	Control—Volume control and power switch
34662	Cord—Tuning condenser drive cord
34392	Drum—Variable tuning condenser drive drum
11765	Lamp—Dial lamp
5040	Plug—4 contact female plug for speaker
34663	Pulley—Range switch pulley and hub
14281	Resistor—68 ohms, ½ watt (R1)
30545	Resistor—180 ohms, ½ watt (R4)
30735	Resistor—560 ohms, 1 watt (R17)
12955	Resistor—3,900 ohms, ½ watt (R9)
14559	Resistor—10,000 ohms ½ watt (R16)
33489	Resistor—15,000 ohms 2½ watt (R6, R22)
14284	Resistor—22,000 ohms 1/10 watt
13998	Resistor—22,000 ohms ½ watt (R5)
12454	Resistor—33,000 ohms ½ watt (R23)
14560	Resistor—100,000 ohms ½ watt (R8)
12285	Resistor—470,000 ohms ½ watt (R14, R15, R19, R20)
12013	Resistor—1 meg., 1/10 watt (R21)
13730	Resistor—1 megohm ½ watt (R2, R3)
12679	Resistor—2.2 megohm ½ watt (R7)
13601	Resistor—10 megohm ½ watt (R12, R18)
4669	Screw—No. 8-32 square head set screw for drum Stock No. 34392
14350	Screw—Square head set screw for pulley Stock No. 34663
34655	Shaft—Tuning knob shaft and flywheel
31364	Socket—Dial lamp socket
34864	Socket—Magic Eye socket
14278	Socket—Phonograph input socket
31251	Socket—Tube socket
13638	Spring—Tuning condenser drive drum spring
34646	Switch—Range switch
34664	Switch—Slide switch for tone control
32263	Transformer—1st I.F. transformer
14308	Transformer—2nd I.F. transformer
31734	Transformer—Power transformer—110 volts 25 cycle
31735	Transformer—Power transformer—Universal 50-60 cycle
31733	Transformer—Power transformer—110 volt 60 cycle
	SPEAKER ASSEMBLIES MODEL 9Q1 (RL-63K5)
31825	Cap—Dust cap
34615	Cone—Cone complete with voice coil
5039	Plug—4 contact male plug for speaker
34671	Speaker—8" Dynamic complete with cone and voice coil less output transformer and plug
14534	Transformer—Output transformer
	SPEAKER ASSEMBLIES MODEL 9QK (RL-70J3)
31825	Cap—Dust cap
12079	Coil—Field coil
11469	Coil—Neutralizing coil
31275	Cone—Cone complete with voice coil
5039	Plug—4 prong male plug for speaker
14534	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
34268	Cap—Rubber cap for Magic Eye
34285	Clip—Magic Eye clip
32634	Cord—Band indicator drive cord
34674	Dial—Glass dial scale
34673	Frame—Dial frame assembly complete with frame, brackets and stud less dial, pointer, pointer rod, band indicator, band indicator spring, Magic Eye clip, cord.
34676	Indicator—Band indicator disc
34490	Knob—Range switch knob
34677	Knob—Tone control knob
34489	Knob—Tuning or volume control and power switch knob
34675	Pointer—Station selector pointer and carriage
34491	Shaft—Pointer carriage guide shaft
34678	Shaft—Tone control extension shaft for Model 9QK
30756	Spring—Band indicator drive cord spring
4982	Spring—Retaining spring for knob Stock No. 34489
14270	Spring—Retaining spring for knob Stock No. 34490 and Stock No. 34677
33726	Washer—"C" washer for indicator Stock No. 34676

RCA Victor

MODEL 9Q4

Chassis No. RC-478

Nine-Tube, Four-Band, A-C, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

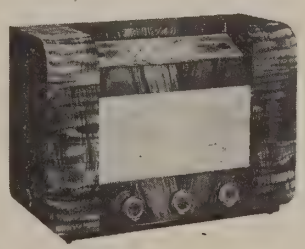
Long Wave ("X" Band)	145-405 kc (2,069-740 m)
Standard Broadcast ("A" Band)	540-1,720 kc (555-174 m)
Medium Wave ("B" Band)	2.3-7.0 mc (130-42.8 m)
Short Wave ("C" Band)	7.0-22.0 mc (42.8-13.6 m)

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SK7 ..... R-F Amplifier
(2) RCA-6SA7 ..... 1st Detector-Oscillator
(3) RCA-6SK7 ..... I-F Amplifier
(4) RCA-6SQ7 ..... 2nd Detector, A.V.C., and A-F Amplifier
(5) RCA-6SF5 ..... Phase Inverter
(6) RCA-6F6-G ..... Output
(7) RCA-6F6-G ..... Output
(8) RCA-6U5/6G5 ..... Tuning Indicator
(9) RCA-5U4-G ..... Rectifier

PILOT LAMPS (2) ..... Mazda No. 44, 6.3 volts, 0.25 amp.



POWER OUTPUT RATING

Undistorted	10 watts
Maximum	12 watts

LOUDSPEAKER (RL-63K-3)

Type	8-inch electrodynamic
V.C. Impedance	2.2 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 115 watts
Rating B	105-125 volts, 25-60 cycles, 115 watts
Rating C	105-130, 140-160, 200-250 volts, 40-60 cycles, 115 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	15⅞	22¼	9⅞
Chassis Base Dimensions (inches)	2⅞	15⅝	6½
Over-all Chassis Height (inches)			11½
Weight (Net lbs.)			37
Tuning Drive Ratio			36 to 1

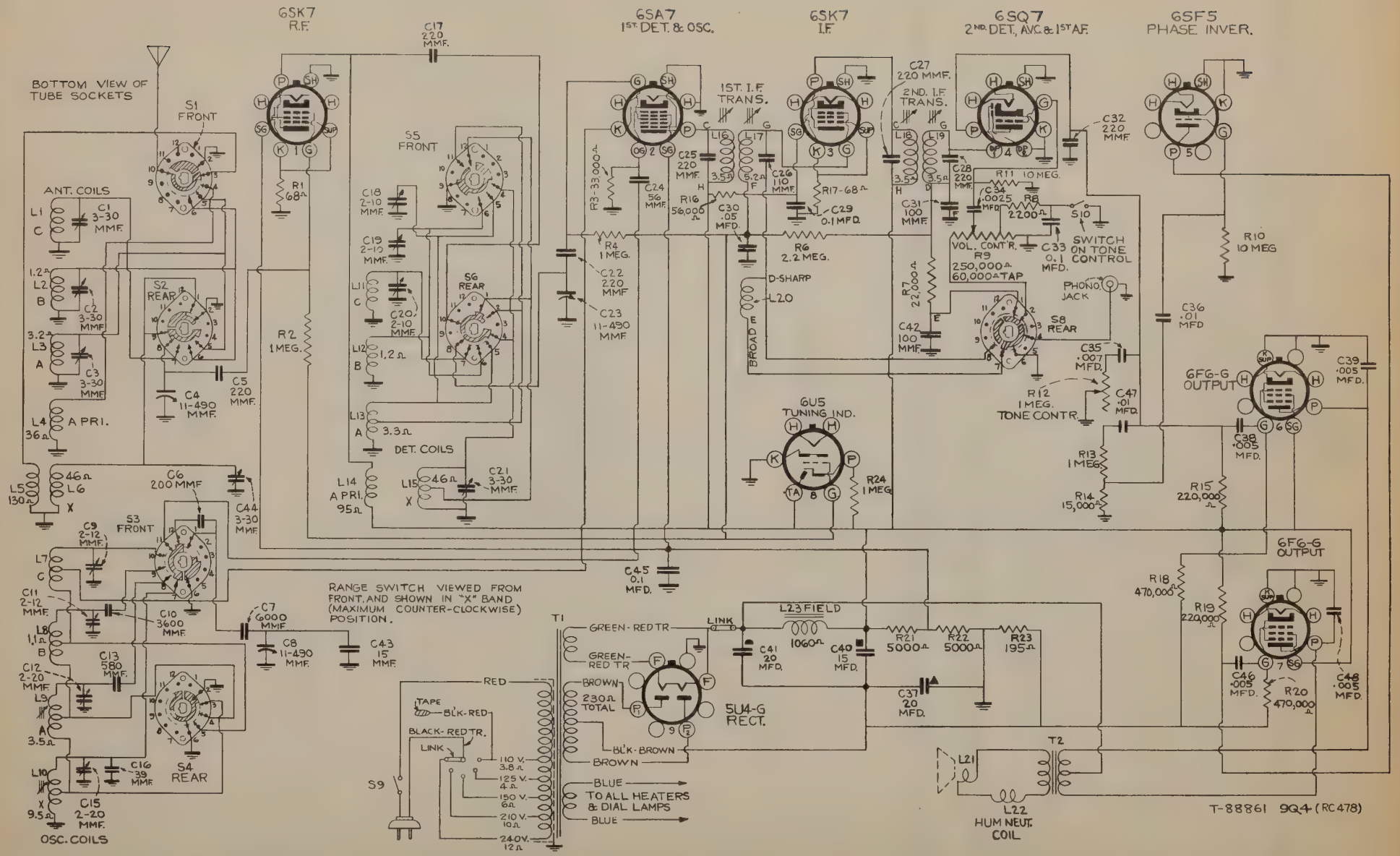
General Description

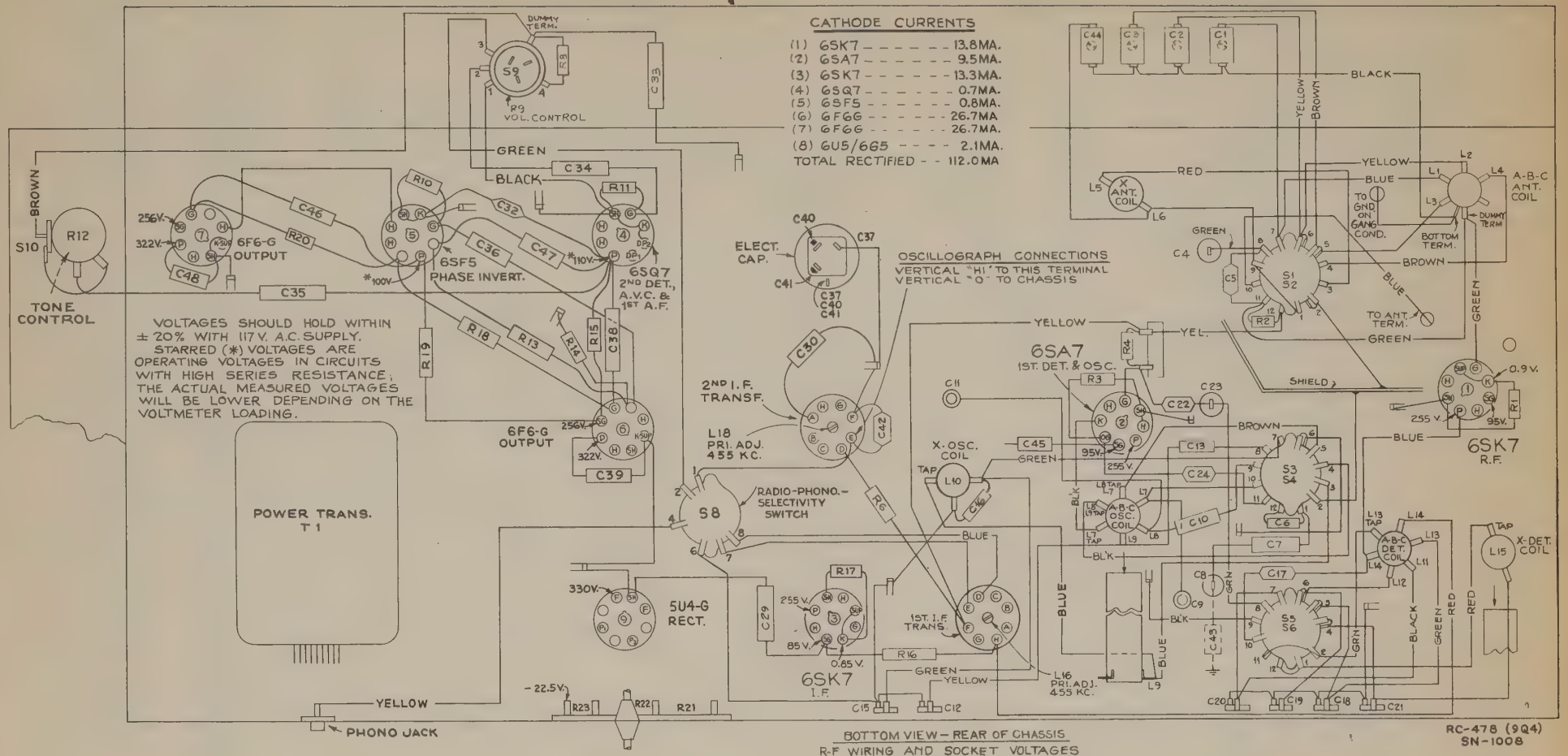
Model 9Q4 is a table-type receiver incorporating a nine-tube, four-band circuit, and housed in a modern streamlined plastic cabinet. Features of design include: Continuously variable tone control; three position radio-phonograph switch (including one high-fidelity position); new magnetite-core I-F transformers, giving increased sensitivity and selectivity; automatic volume control; edge-lighted, angle-vision, straight-line dial; bass compensation switch.

Trademarks "Victrola," "RCA Victor," "Magic Eye," "Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

First Edition

Printed in U. S. A.


6SK7 R.F.
6SA7 1ST DET. & OSC.
6SK7 I.F.
6SQ7 2ND. DET., AVC. & 1ST A.F.
6SF5 PHASE INVER.
BOTTOM VIEW OF TUBE SOCKETS
ANT. COILS
S1 FRONT
S2 REAR
S3 FRONT
S4 REAR
S5 FRONT
S6 REAR
S8 REAR
S9
S10
C1 3-30 MMF.
C2 3-30 MMF.
C3 3-30 MMF.
C4 11-490 MMF.
C5 220 MMF.
C6 200 MMF.
C7 6000 MMF.
C8 11-490 MMF.
C9 2-12 MMF.
C10 3600 MMF.
C11 2-12 MMF.
C12 2-20 MMF.
C13 580 MMF.
C15 2-20 MMF.
C16 39 MMF.
C17 220 MMF.
C18 2-10 MMF.
C19 2-10 MMF.
C20 2-10 MMF.
C21 3-30 MMF.
C22 220 MMF.
C23 11-490 MMF.
C24 56 MMF.
C25 220 MMF.
C26 110 MMF.
C27 220 MMF.
C28 220 MMF.
C29 0.1 MFD.
C30 .05 MFD.
C31 100 MMF.
C32 220 MMF.
C33 0.1 MFD.
C34 .0025 MFD.
C35 .007 MFD.
C36 .01 MFD.
C37 20 MFD.
C38 .005 MFD.
C39 .005 MFD.
C40 15 MFD.
C41 20 MFD.
C42 100 MMF.
C43 15 MFD.
C44 3-30 MMF.
C45 0.1 MFD.
C46 .005 MFD.
C47 .01 MFD.
C48 .005 MFD.
R1 68Ω
R2 1 MEG.
R3 33,000Ω
R4 1 MEG.
R6 2.2 MEG.
R7 22,000Ω
R8 2200Ω
R9 250,000Ω 60,000Ω TAP
R10 10 MEG
R11 10 MEG.
R12 1 MEG. TONE CONTR.
R13 1 MEG
R14 15,000Ω
R15 220,000Ω
R16 56,000Ω
R17 68Ω
R18 470,000Ω
R19 220,000Ω
R20 470,000Ω
R21 5000Ω
R22 5000Ω
R23 195Ω
R24 1 MEG
1ST. I.F. TRANS.
2ND. I.F. TRANS.
SWITCH ON TONE CONTROL
PHONO. JACK
6U5 TUNING IND.
6FG-G OUTPUT
6FG-G OUTPUT
L1 C
L2 B
L3 A
L4 36Ω A PRI.
L5 130Ω
L6 46Ω X
L7 C
L8 1.1Ω B
L9 A 3.5Ω
L10 X 9.5Ω
L11 C
L12 B 1.2Ω
L13 A 3.3Ω DET. COILS
L14 A PRI. 95Ω
L15 46Ω X
L16 3.5Ω H
L17 5.2Ω F
L18 3.5Ω C
L19 3.5Ω D
L20 D-SHARP BROAD E
L21
L22 HUM NEUT. COIL
L23 FIELD 1060Ω
T1
T2
5U4-G RECT.
OSC. COILS
RANGE SWITCH VIEWED FROM FRONT, AND SHOWN IN "X" BAND (MAXIMUM COUNTER-CLOCKWISE) POSITION.
GREEN-RED TR
GREEN-RED TR
BROWN 230Ω TOTAL
BLK-BROWN
BROWN
BLUE
TO ALL HEATERS & DIAL LAMPS
BLUE
RED
TAPE
BLK-RED
BLACK-RED TR.
LINK
LINK
110 V. 3.8Ω
125 V. 4Ω
150 V. 6Ω
210 V. 10Ω
240 V. 12Ω
T-88861 9Q4 (RC478)


CATHODE CURRENTS
(1) 6SK7 - - - - - - 13.8MA.
(2) 6SA7 - - - - - - 9.5MA.
(3) 6SK7 - - - - - - 13.3MA.
(4) 6SQ7 - - - - - - 0.7MA.
(5) 6SF5 - - - - - - 0.8MA.
(6) 6F6G - - - - - - 26.7MA
(7) 6F6G - - - - - - 26.7MA.
(8) 6U5/6G5 - - - - 2.1MA.
TOTAL RECTIFIED - - 112.0MA
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL
VERTICAL "O" TO CHASSIS
VOLTAGES SHOULD HOLD WITHIN ± 20% WITH 117 V. A.C. SUPPLY.
STARRED (*) VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE; THE ACTUAL MEASURED VOLTAGES WILL BE LOWER DEPENDING ON THE VOLTMETER LOADING.
TONE CONTROL
6F6-G OUTPUT
6SF5 PHASE INVERT.
6SQ7 2ND DET., A.V.C. & 1ST A.F.
ELECT. CAP.
2ND I.F. TRANSF.
L18 PRI. ADJ. 455 KC.
RADIO-PHONO.-SELECTIVITY SWITCH
POWER TRANS. T1
5U4-G RECT.
1ST I.F. TRANS.
6SK7 I.F.
L16 PRI. ADJ. 455 KC.
6SA7 1ST. DET. & OSC.
X. OSC. COIL
A-B-C OSC. COIL
A-B-C DET. COIL
A-B-C ANT. COIL
X-DET. COIL
X ANT. COIL
6SK7 R.F.
PHONO JACK
VOL. CONTROL
DUMMY TERM.
TO GND ON GANG COND.
BOTTOM TERM.
TO ANT. TERM.
BOTTOM VIEW—REAR OF CHASSIS
R-F WIRING AND SOCKET VOLTAGES
RC-478 (9Q4)
SN-1008

Precautionary Lead Dress:

1. Dress black lead from L11 to C20 away from other leads.
2. Dress the green lead from the middle section of the gang away from any other leads, parts, or chassis.
3. Dress the black diode lead running between the 6SQ7 and terminal G on the 2nd I-F transformer, directly against the chassis.
4. Twist the power leads together and dress them away from the 6SQ7 socket, and also away from the yellow phono input lead.
5. Keep green lead of 6SK7 R-F grid circuit away from blue antenna lead.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

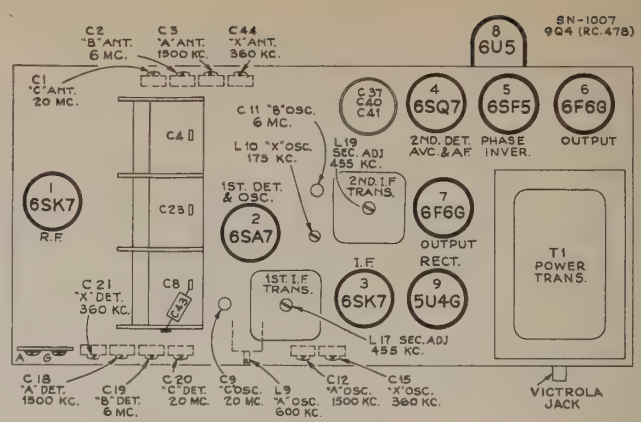
Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

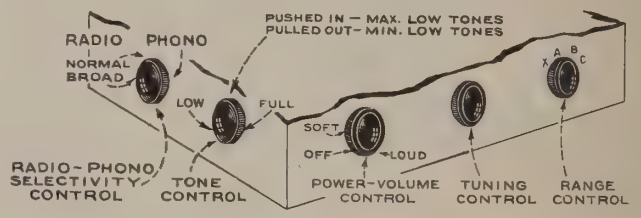
As the first step in r-f alignment, check the position of the drum. The 0° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed.

For additional details, refer to booklet "RCA Victor Receiver Alignment."



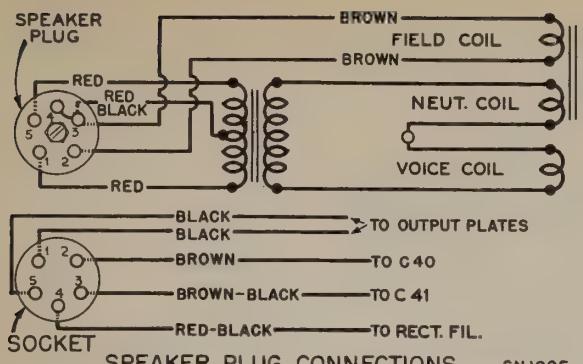


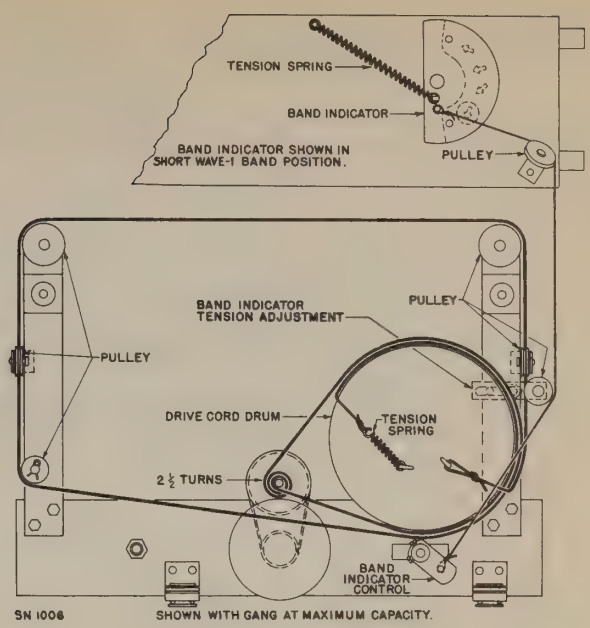
Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Turn tone control to 2nd position (sharp) from maximum counter-clockwise.			
2	6SK7 I-F grid in series with .01 mfd.	455 kc	"A" Band Quiet point between 550-750 kc	L18 and L19 (2nd I-F trans.)
3	6SA7 grid in series with .01 mfd.			L16 and L17 (1st I-F trans.)
4	Turn tone control to maximum counter-clockwise (broad) position and check I-F response which should be a slightly double-peaked curve. Return tone control to 2nd position (sharp) for the following steps.			
5	Ant. terminal in series with 200 mmfd.	175 kc	175 kc (52.5°) "X" Band	L10 (osc.) Rock gang
6		360 kc	360 kc (148.5°) "X" Band	C15 (osc.) C21 (det.) C44 (ant.)
7		600 kc	600 kc (32°) "A" Band	L9 (osc.) Rock gang
8		1,500 kc	1,500 kc (152°) "A" Band	C12 (osc.) C18 (det.) C3 (ant.)
9	Repeat steps 5, 6, 7, and 8.			
10	Ant. terminal in series with 300 ohms	6.1 mc	6.1 mc (151°) "B" Band	C11 (osc.)* C19 (det.) C2 (ant.)
11		20 mc	20 mc (157°) "C" Band	C9 (osc.)** C20 (det.) C1 (ant.)

* Use **minimum** capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning receiver to approximately 5.19 mc where a weaker signal should be received.

** Use **minimum** capacity peak if two can be obtained. Check to determine that C9 has been adjusted to the correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

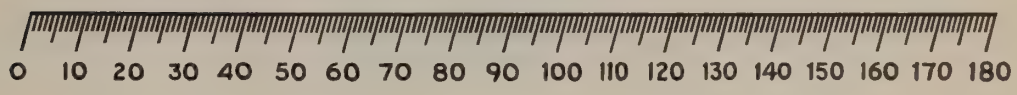
Note.—Oscillator tracks **above** signal on all bands.

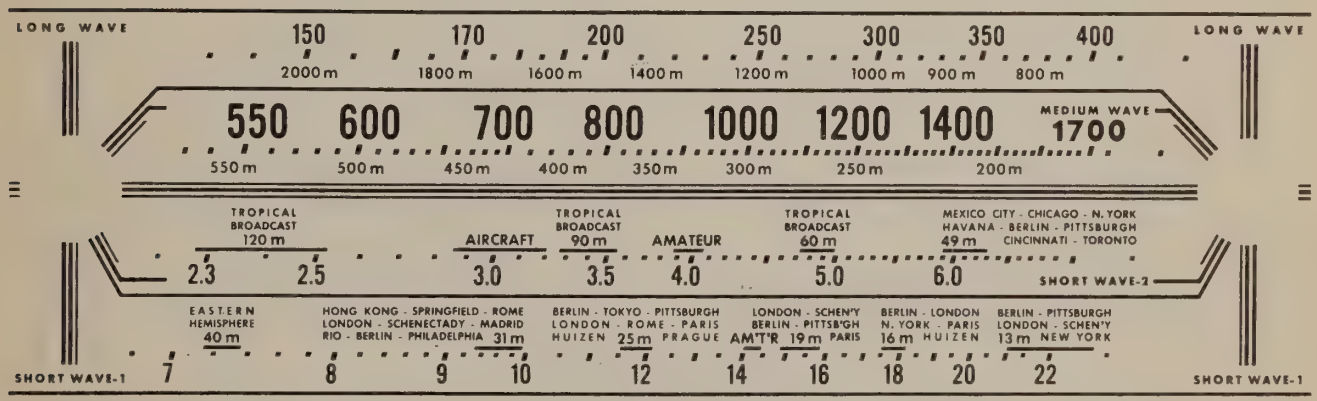




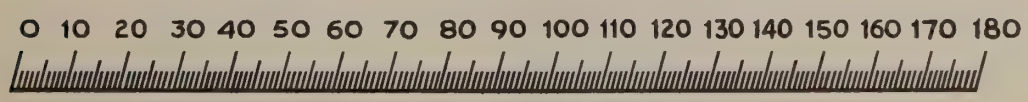
At Right—Drive Cord and Band Indicator Arrangement

Calibration Scale




LONG WAVE
150 170 200 250 300 350 400
2000 m 1800 m 1600 m 1400 m 1200 m 1000 m 900 m 800 m
550 600 700 800 1000 1200 1400 MEDIUM WAVE 1700
550 m 500 m 450 m 400 m 350 m 300 m 250 m 200 m
TROPICAL BROADCAST 120 m
AIRCRAFT
TROPICAL BROADCAST 90 m
AMATEUR
TROPICAL BROADCAST 60 m
MEXICO CITY - CHICAGO - N. YORK HAVANA - BERLIN - PITTSBURGH CINCINNATI - TORONTO 49 m
2.3 2.5 3.0 3.5 4.0 5.0 6.0
SHORT WAVE-2
EASTERN HEMISPHERE 40 m
HONG KONG - SPRINGFIELD - ROME LONDON - SCHENECTADY - MADRID RIO - BERLIN - PHILADELPHIA 31 m
BERLIN - TOKYO - PITTSBURGH LONDON - ROME - PARIS HUIZEN 25 m PRAGUE
LONDON - SCHEN'Y BERLIN - PITTSB'GH AM'T'R 19 m PARIS
BERLIN - LONDON N. YORK - PARIS 16 m HUIZEN
BERLIN - PITTSBURGH LONDON - SCHEN'Y 13 m NEW YORK
SHORT WAVE-1
7 8 9 10 12 14 16 18 20 22
SHORT WAVE-1

27884



Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 152° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-478)
34401	Arm—Arm and hub for band indicator less cable—fastens on range switch shaft
34400	Belt—Drive belt
31767	Board—"Ant.-Grd." terminal board
32635	Cable—Cable and clips for band indicator
33821	Capacitor—Mica trimmer—3 sections 2-10 mmfd. and 1 section 3-30 mmfd. (C18, C19, C20, C21)
12714	Capacitor—Air trimmer, 2-12 mmfd. (C9, C11)
33818	Capacitor—Mica trimmer, 2 sections 2-20 mmfd. each (C12, C15)
12896	Capacitor—15 mmfd. (C43)
33822	Capacitor—Mica trimmer, 4 sections 3-30 mmfd. each (C1, C2, C3, C44)
13545	Capacitor—39 mmfd. (C16)
12723	Capacitor—56 mmfd. (C24)
12720	Capacitor—100 mmfd. (C42, C31)
32239	Capacitor—110 mmfd. (C26)
30232	Capacitor—200 mmfd. (C6)
12694	Capacitor—220 mmfd. (C5, C17, C22, C32)
33760	Capacitor—220 mmfd. (C25, C27, C28)
33235	Capacitor—580 mmfd. (C13)
12811	Capacitor—3,600 mmfd. (C10)
31405	Capacitor—6,000 mmfd. (C7)
34459	Capacitor—.0025 mfd. (C34)
33584	Capacitor—.005 mfd. (C38, C39, C46, C48)
5148	Capacitor—.007 mfd. (C35)
4937	Capacitor—.01 mfd. (C36, C47)
32787	Capacitor—.05 mfd. (C30)
4839	Capacitor—0.1 mfd. (C29, C33, C45)
34393	Capacitor—Electrolytic—2 sections 20 mfd. and 1 section 15 mfd. (C37, C40, C41)
33762	Coil—Antenna coil A-B-C Bands (L1, L2, L3, L4)
32823	Coil—Antenna coil X Band (L5, L6)
33763	Coil—Detector coil A-B-C Bands (L11, L12, L13, L14)
33765	Coil—Detector coil X Band (L15)
33764	Coil—Oscillator coil A-B-C Bands (L7, L8, L9)
32931	Coil—Oscillator coil X Band (L10)
33756	Condenser—3-gang variable tuning condenser (C4, C8, C23)
34595	Control—Tone control (R12)
32713	Core—Adjustable core and stud for A-B-C Band coil
34392	Drum—Variable condenser drive drum
11891	Lamp—Dial lamp
14028	Nut—Clamping nut for air trimmer
31817	Plate—Cushion socket mounting plate, less socket
12493	Plug—5-contact female plug for speaker cable
34399	Pulley—Drive belt pulley and set screws for tuning knob shaft
34398	Pulley—Drive belt pulley and set screws for intermediate drive shaft
31373	Pulley—Drive cord pulley for L.H. support
34402	Pulley—Drive cord pulley and bracket for R.H. support
34394	Pulley—L.H. support and drive cord pulleys (2) assembled, less loose pulley
34395	Pulley—R.H. support and drive cord pulleys (2) assembled, less loose pulley and bracket
14281	Resistor—68 ohms, ½ watt (R1, R17)
13716	Resistor—2,200 ohms, ½ watt (R8)
34189	Resistor—Voltage divider, 2 sections 5,000 ohms and 1 section 195 ohms (R21, R22, R23)
12695	Resistor—15,000 ohms, ½ watt (R14)
13998	Resistor—22,000 ohms, ½ watt (R7)
12454	Resistor—33,000 ohms, ½ watt (R3)
30650	Resistor—56,000 ohms, ½ watt (R16)
12264	Resistor—220,000 ohms, ½ watt (R15, R19)
12285	Resistor—470,000 ohms, ½ watt (R18, R20)
12013	Resistor—1 megohm, 1/10 watt (R24)
13730	Resistor—1 megohm, ½ watt (R2, R4, R13)
12679	Resistor—2.2 megohm, ½ watt (R6)
13601	Resistor—10 megohm, ½ watt (R11, R10)
30340	Retainer—Retaining clip for pulley, Stock No. 31373
34396	Shaft—Intermediate tuning drive shaft, and drive cord pulley—less drive belt pulley and set screws
34397	Shaft—Intermediate tuning drive shaft, and flywheel—less drive belt pulley and set screws
31364	Socket—Dial lamp socket
34864	Socket—Magic Eye socket
14278	Socket—Phono. input socket
31251	Socket—Tube socket
31418	Spring—Pointer drive cord tension spring
34391	Switch—Phono. switch and fidelity control switch (S8)
34390	Switch—Range switch (S1, S2, S3, S4, S5, S6)
34596	Switch—Slide switch for tone control (S10)
33759	Transformer—First i-f transformer (L16, L17, L20, C25, C26)
33761	Transformer—Second i-f transformer (L18, L19, C27, C28, C31, R7)
34183	Transformer—Power transformer — 100/130, 140/160, 195/250 volts, 50/60 cycles (T1)
34389	Volume Control—Volume control and power switch (R9, S9)
33726	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLIES (RL63K3)
31825	Cap—Dust cap
34615	Cone—Cone complete with voice coil (L2)
31539	Plug—5-prong male plug for speaker
34691	Speaker—8-inch dynamic complete with cone and voice coil—less output transformer
14534	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
MI-8105	Adapter—European adapter for power cord
30766	Cap—"Magic Eye" rubber cap
30716	Clip—"Magic Eye" clip
34486	Dial—Glass dial scale (English)
34504	Dial—Glass dial scale (Greek)
34485	Frame—Dial frame complete with brackets and pulleys less dial, indicator pointer, pointer rods, band indicator, band indicator spring and Magic Eye clip
34488	Indicator—Band indicator
34487	Indicator—Station selector indicator pointer
34490	Knob—Tone control or radio phonograph knob
34489	Knob—Tuning range switch or volume control and power switch knob
4393	Screw—No. 8-32 headless set screw for knob, Stock No. 34490
33438	Screw—Magic Eye clip screw
34491	Shaft—Indicator pointer guide shaft
30756	Spring—Band indicator spring
4982	Spring—Retaining spring for knob, Stock No. 34489
33726	Washer—Band indicator retaining washer

RCA Victor

MODELS K-50 and T-55

Chassis Nos. RC-418A and RC-418

Five-Tube, Single-Band, A-C, Superheterodynes

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 33 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGE

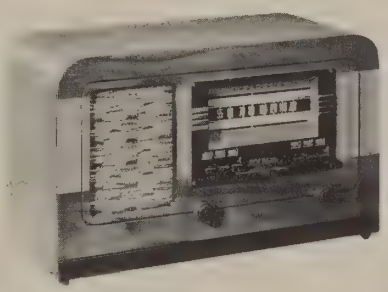
Standard Broadcast and one police band ..... 540-1,720 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SA7 ... 1st. Detector-Oscillator
(2) RCA-6SK7 ..... I-F Amplifier
(3) RCA-6SQ7 ... 2nd. Detector, A.V.C. and A-F Amplifier
(4) RCA-6F6-G ..... Power Output
(5) RCA-5Y3-G ..... Rectifier

PILOT LAMP (1) .....Mazda No. 44, 6.3 volts, 0.25 amp.



Model T-55

POWER OUTPUT RATING

Undistorted ..... 2 watts
Maximum ..... 4 watts

POWER SUPPLY RATINGS

Rating A.....105-125 volts, 50-60 cycles, 75 watts
Rating B.....105-125 volts, 25-60 cycles, 75 watts
Rating C....105-125, 200-250 volts, 50-60 cycles, 75 watts

LOUDSPEAKER	T55	K50
Type	5 inch electrodynamic	12 inch electrodynamic
V. C. impedance at 400 cycles	3.4 ohms	2.2 ohms

Mechanical Specifications

CABINET DIMENSIONS (inches)	T55	K50
Height	9-7/16	37-1/4
Width	15-5/8	24
Depth	7	11-1/8
Shipping Weight (approx.)	17 lbs.	48 lbs.
Net Weight	12-1/2 lbs.	37 lbs.

Chassis dimensions, both models.. 12 inches wide, 5-3/4 inches deep, 2-1/8 inches high.

Maximum overall chassis height..... 6-3/4
Tuning drive ratio ..... 9 to 1

General Description

These two models are five tube superheterodyne receivers with a tuning range covering standard broadcast stations and one police band. They can be obtained with several types of a.c. operated power supplies suitable for operation at the line voltages and frequencies specified under "Power Supply Ratings" above. Model K50 is a console receiver equipped with a 12 inch electrodynamic loudspeaker. Model T55 is a table model equipped with a loop antenna.

Model K-50

Power line antenna: Model K50 is provided with a built in power line antenna. To use this antenna a jumper should be connected between terminals "A" and "L" on the antenna terminal strip. If an outside antenna is used it should be connected to "A", no connection being made to terminal "L".

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

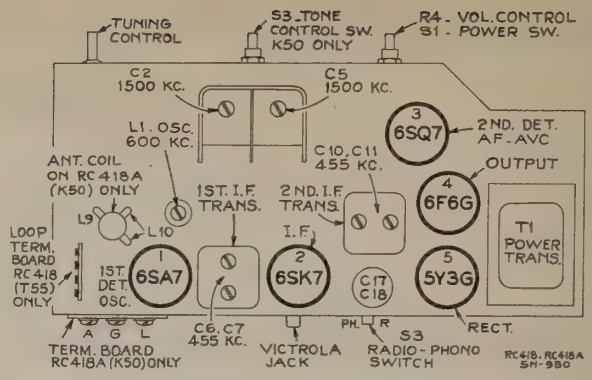
2. Set the radio-phono switch to "radio" position and accurately tune in the station for which the first button is to be set.

3. Press in push-button rod No. 1 (left) with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

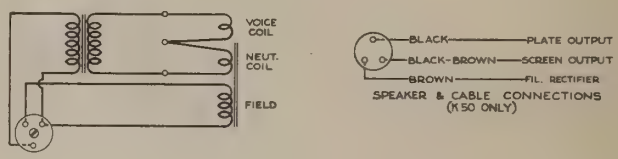
4. Replace the push-button on its shaft.

5. Proceed in a similar manner for the remainder of the push-buttons.

6. Insert the station marker tabs in the recesses above the push-buttons.



Tube and Trimmer Locations



ALIGNMENT PROCEDURE

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the chassis drawing.

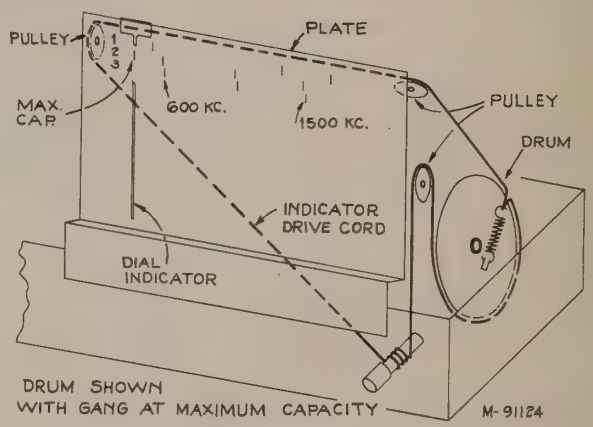
Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

For additional details, refer to booklet "RCA Victor Receiver Alignment."

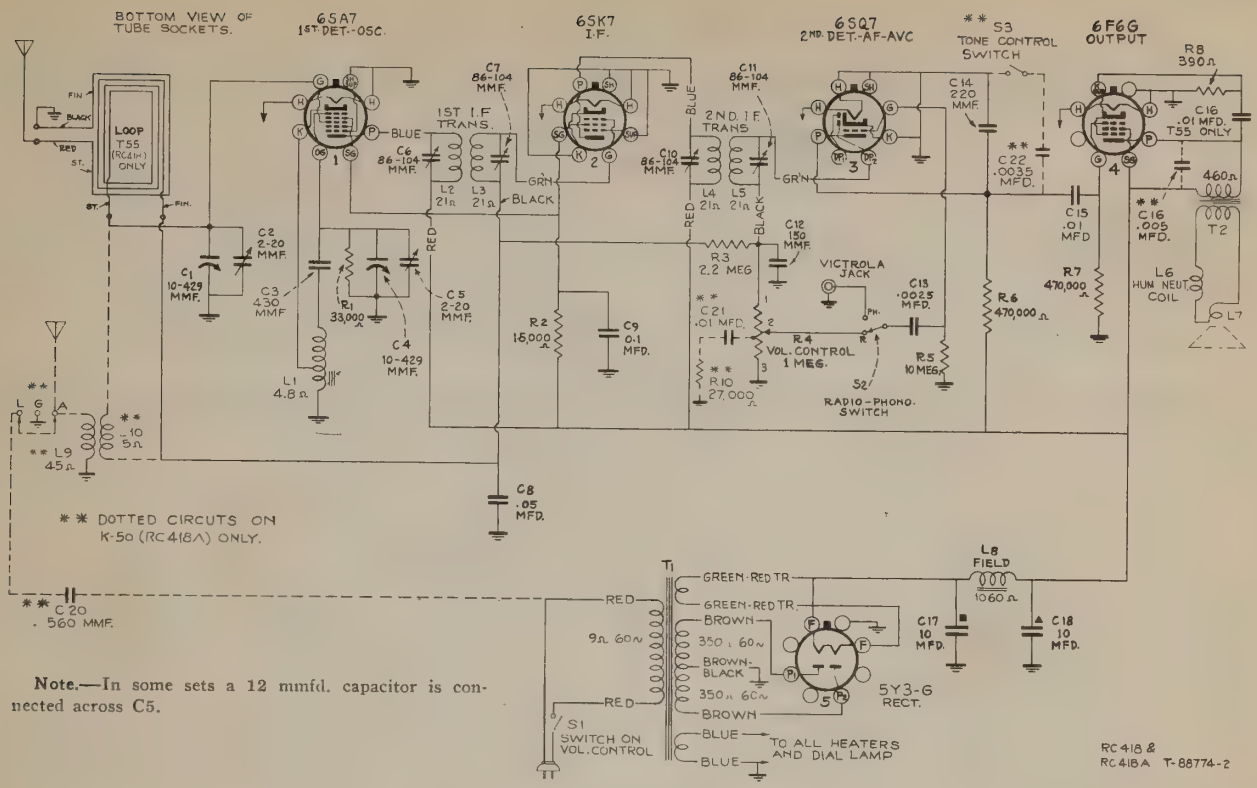


Dial-Indicator and Drive Mechanism

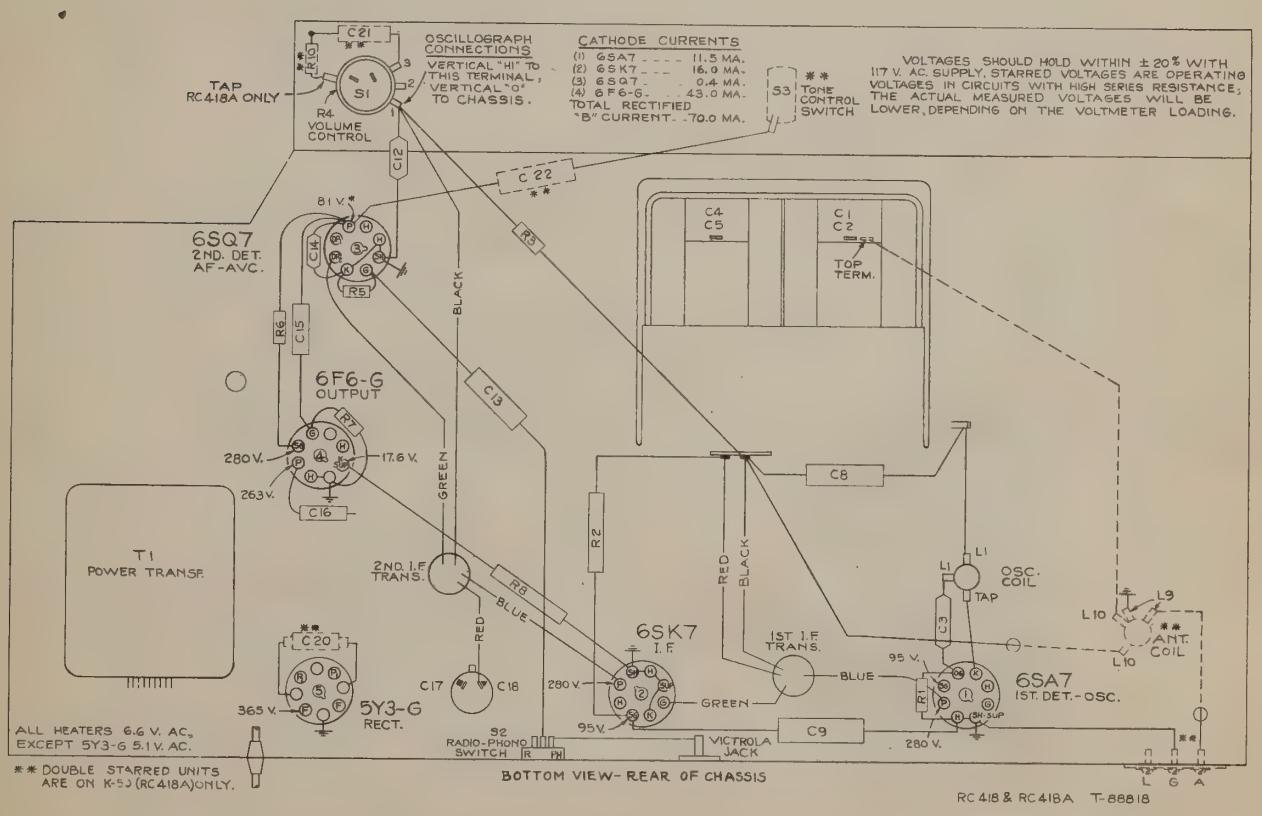
Refer to "Alignment Procedure" for explanation of the "calibration marks" shown in this drawing

Steps	Connect the high side of the test-osc. to—	Tune test osc. to—	Turn radio dial to	Adjust the following for maximum peak output
1	Antenna terminal	455 kc	Quiet Point between 1,720-1,500 kc	C10 and C11 (2nd I-F trans.)
2	Antenna terminal			C6 and C7 (1st I-F trans.)
3	Ant. terminal in series with 200 mmfd.	1,500 kc	1,500 kc calibration mark	C5 (osc.) C2 (ant.)
4		600 kc	600 kc calibration mark	L1 (osc.) (Rock in)
5	Repeat step 3			

Note.—Oscillator tracks above signal.


BOTTOM VIEW OF TUBE SOCKETS.
6SA7 1ST. DET.-OSC.
6SK7 I.F.
6SQ7 2ND. DET.-AF-AVC
** S3 TONE CONTROL SWITCH
6F6G OUTPUT
LOOP T55 (RC418) ONLY
1ST I.F. TRANS.
2ND. I.F. TRANS
VICTROLA JACK
VOL. CONTROL 1 MEG.
RADIO-PHONO. SWITCH
** DOTTED CIRCUITS ON K-50 (RC418A) ONLY.
** C20 . 560 MMF.
Note.—In some sets a 12 mmfd. capacitor is connected across C5.
T1
5Y3-G RECT.
L8 FIELD 1060Ω
S1 SWITCH ON VOL. CONTROL
TO ALL HEATERS AND DIAL LAMP
RC 418 & RC 418A T-88774-2

Schematic Circuit Diagram


OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL; VERTICAL "0" TO CHASSIS.
CATHODE CURRENTS
(1) 6SA7 - - - - 11.5 MA.
(2) 6SK7 - - - - 16.0 MA.
(3) 6SQ7 - - - - 0.4 MA.
(4) 6F6-G. - - - 43.0 MA.
TOTAL RECTIFIED "B" CURRENT - 70.0 MA.
VOLTAGES SHOULD HOLD WITHIN ±20% WITH 117 V. AC. SUPPLY, STARRED VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE; THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.
TAP RC418A ONLY
R4 VOLUME CONTROL
** S3 TONE CONTROL SWITCH
6SQ7 2ND. DET. AF-AVC.
6F6-G OUTPUT
TOP TERM.
T1 POWER TRANSF.
2ND. I.F. TRANS.
6SK7 I.F.
1ST. I.F. TRANS.
OSC. COIL
ANT. COIL
6SA7 1ST. DET.-OSC.
5Y3-G RECT.
ALL HEATERS 6.6 V. AC. EXCEPT 5Y3-G 5.1 V. AC.
** DOUBLE STARRED UNITS ARE ON K-50 (RC418A) ONLY.
BOTTOM VIEW-REAR OF CHASSIS
RC 418 & RC 418A T-88818

R-F Wiring Diagram and Socket Voltages

Miscellaneous Service Data

To center the loudspeaker voice coil, first remove the front dust cover then loosen the spider screws, insert three narrow feelers in the gap, and tighten the spider screws. Remove the feelers and fasten a dust cover in place with loudspeaker cement.

Precautionary Lead Dress.—

1. Power cord leads must be dressed up away from 6SQ7 socket, and toward end of chassis.

2. Green lead 2nd I.F. to 6SQ7 must be dressed against base.

3. Blue lead 2nd I.F. to 6SK7 must be dressed close to base.

4. Green and blue leads from 1st I.F. transformer must be dressed close to base.

5. Capacitor from volume control center tap to 6SQ7 socket must be dressed so that its body is between AC terminal on control and opening in chassis for gang condenser.

6. Red lead from "L" terminal on antenna board to 5Y3G socket must be dressed against base.

7. Green lead from gang to 6SA7 socket must be dressed toward side apron away from other parts.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
	Model T-55 (RC-418) Model K-50 (RC-418A)
33719	Belt—Tuning unit push arm belt
33718	Board—Antenna-Ground terminal board
12725	Capacitor—150 mmfd. (C12)
12694	Capacitor—220 mmfd. (C14)
32599	Capacitor—430 mmfd. (C3)
12537	Capacitor—560 mmfd. (C20) Model K50
5107	Capacitor—.0025 mfd. (C13)
30303	Capacitor—.0035 mfd. (C22) Model K50
33584	Capacitor—.005 mfd. (C16) Model K50
4937	Capacitor—.01 mfd. (C15, C16, C21) (C16 in Model T55 only) (C21 in Model K50 only)
32787	Capacitor—.05 mfd. (C8)
4839	Capacitor—0.1 mfd. (C9)
33775	Coil—Antenna coil (L9, L10) Model K50
33724	Coil—Oscillator coil (L1)
32342	Condenser—Electrolytic, 2 sections 10 mfd. each (C17, C18)
33630	Control—Tone control (S3) Model K50
32634	Cord—Drive cord
33633	Indicator—Dial scale pointer
11765	Lamp—Dial lamp
33431	Link—Antenna terminal board link
33721	Loop—Antenna loop Model T55
33727	Plate—Dial plate assembly
31388	Resistor—390 ohms, 1 watt (R8)
33489	Resistor—15,000 ohms, 2½ watts (R2)
12738	Resistor—27,000 ohms, ½ watt (R10) Model K50
12454	Resistor—33,000 ohms, ½ watt (R1)
12285	Resistor—470,000 ohms, ½ watt (R6, R7)
12679	Resistor—2.2 meg., ½ watt (R3)
13601	Resistor—10 meg., ½ watt (R5)
33725	Shaft—Tuning knob shaft
31364	Socket—Dial lamp socket
14278	Socket—Phono-input socket
5119	Socket—3 contact female for speaker cable—Model K50
31319	Socket—Tube socket
33720	Spring—Push arm return spring
33634	Switch—Radio-Phono switch (S2)
33722	Transformer—First i-f transformer (L2, L3, C6, C7)
33723	Transformer—Second i-f transformer (L4, L5, C10, C11)
31575	Transformer—Power transformer 110-220 volts, 60 cycle (T1)
33619	Transformer—Power transformer 105-120 volts, 25-60 cycle (T1)
33112	Transformer—Power transformer 105-120 volts, 50-60 cycle (T1)
33631	Volume control and power switch (R4, S1) Model T55
33776	Volume control and power switch (R4, S1) Model K50
33726	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLIES
	(Model T55) (RL-78-6)
32907	Cap—Cone center dust cap
32906	Coil—Hum neutralizing coil (L6)
33601	Coil—Speaker field coil (L8)
32904	Cone—Speaker cone and voice coil (L7)
32905	Transformer—Output transformer (T2)
	SPEAKER ASSEMBLIES
	(Model K50) (RL-70J-2)
31825	Cap—Cone center dust cap
11469	Coil—Hum neutralizing coil (L6)
33116	Coil—Speaker field coil (L8)
31275	Cone—Speaker cone and voice coil (L7)
5118	Plug—3 contact male for speaker
33779	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33637	Bezel—Dial escutcheon
33731	Button—Push button
33730	Clamp—Dial mounting clamp
31456	Covers—8-protective covers for push button markers
33729	Dial—Glass dial scale
30863	Knob—Tuning or volume control knob
33973	Marker—Station selector marker
30900	Spring—Knob or push button retaining spring

RCA Victor

MODEL K50, 2nd Production (Chassis No. RC-497)

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 50—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast ..... 540-1,560 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SA7..... 1st Detector-Oscillator
(2) RCA-6K7..... I-F Amplifier
(3) RCA-6SQ7.. 2nd Detector, A.V.C., and A-F Amplifier
(4) RCA-6F6-G..... Power Output
(5) RCA-5Y3-G..... Rectifier

PILOT LAMP (1)..... Mazda No. 51, 6.3 volts, 0.20 amp.

POWER OUTPUT RATING

Undistorted ..... 2 watts
Maximum ..... 4 watts

POWER SUPPLY RATINGS

Rating A..... 105-125 volts, 50-60 cycles, 75 watts
Rating B..... 105-125 volts, 25-60 cycles, 75 watts
Rating C..... 105-125, 200-250 volts, 50-60 cycles, 75 watts

LOUDSPEAKER

Type ..... 12-inch electrodynamic
V. C. impedance at 400 cycles..... 2.2 ohms

Mechanical Specifications

CABINET DIMENSIONS (inches)	K50
Height	37¼
Width	24
Depth	11⅛
Shipping Weight (approx.)	48 lbs.
Net Weight	37 lbs.

Chassis dimensions ..... 12 inches wide, 5¾ inches deep, 2⅛ inches high

Maximum overall chassis height..... 6¾
Tuning drive ratio..... 9 to 1

General Description

Model K50 is a five tube superheterodyne receiver with a tuning range covering standard broadcast stations and one police band. It can be obtained with several types of a.c. operated power supplies suitable for operation at the line voltages and frequencies specified under "Power Supply Ratings" above. Model K50 is a console receiver equipped with a 12-inch electrodynamic loudspeaker.

Model K-50

First Edition

Trademarks "RCA Victor," and "Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Precautionary Lead Dress:

Before proceeding with alignment dress power cord leads away from 6SQ7 socket and close as possible to end of chassis; dress ground wire to volume control between power leads and audio grid; and dress lead from phono switch to volume control as far away from power leads as possible.

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the chassis schematics.

Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator. — For all alignment operations, keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Marks. — The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

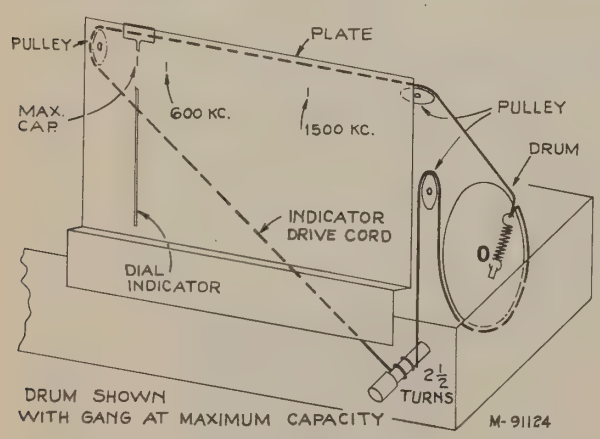
Dial Indicator Adjustment. — With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect test-osc. output to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	I-F grid through 0.1 mfd. capacitor and ground	455 kc	Quiet point between 600-700 kc	L4 and L5 (2nd I-F trans.)
2	1st det. grid through 0.1 mfd. capacitor and ground			L2 and L3 (1st I-F trans.)
3	Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver	1,500 kc	1,500 kc	C2 antenna C5 oscillator*
4		600 kc	Rock at 600 kc	L1 oscillator while rocking
5		1,500 kc	1,500 kc	C2 antenna C5 oscillator*

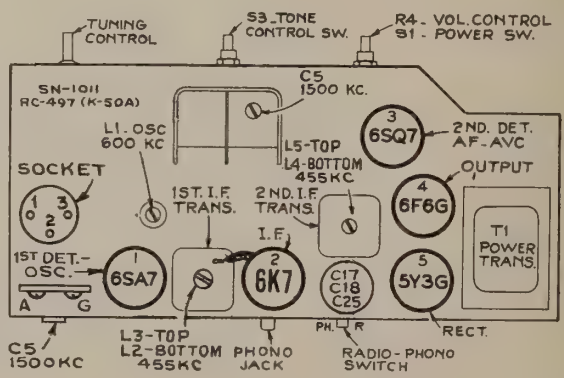
When making adjustments 3 to 5 inclusive the chassis must be in the cabinet, the loop connected, and all leads in their normal positions. When mounting chassis in cabinet if calibration marks on dial plate do not line up with dial scale mounted on cabinet move pointer to agree with dial scale on cabinet.

* Oscillator should track on high frequency side of signal.

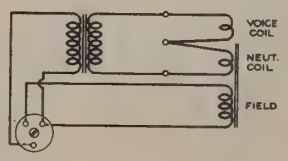


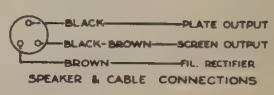
Dial Indicator and Drive Mechanism

Refer to "Alignment Procedure" for explanation of the "calibration marks" shown in this drawing



Tube and Trimmer Locations

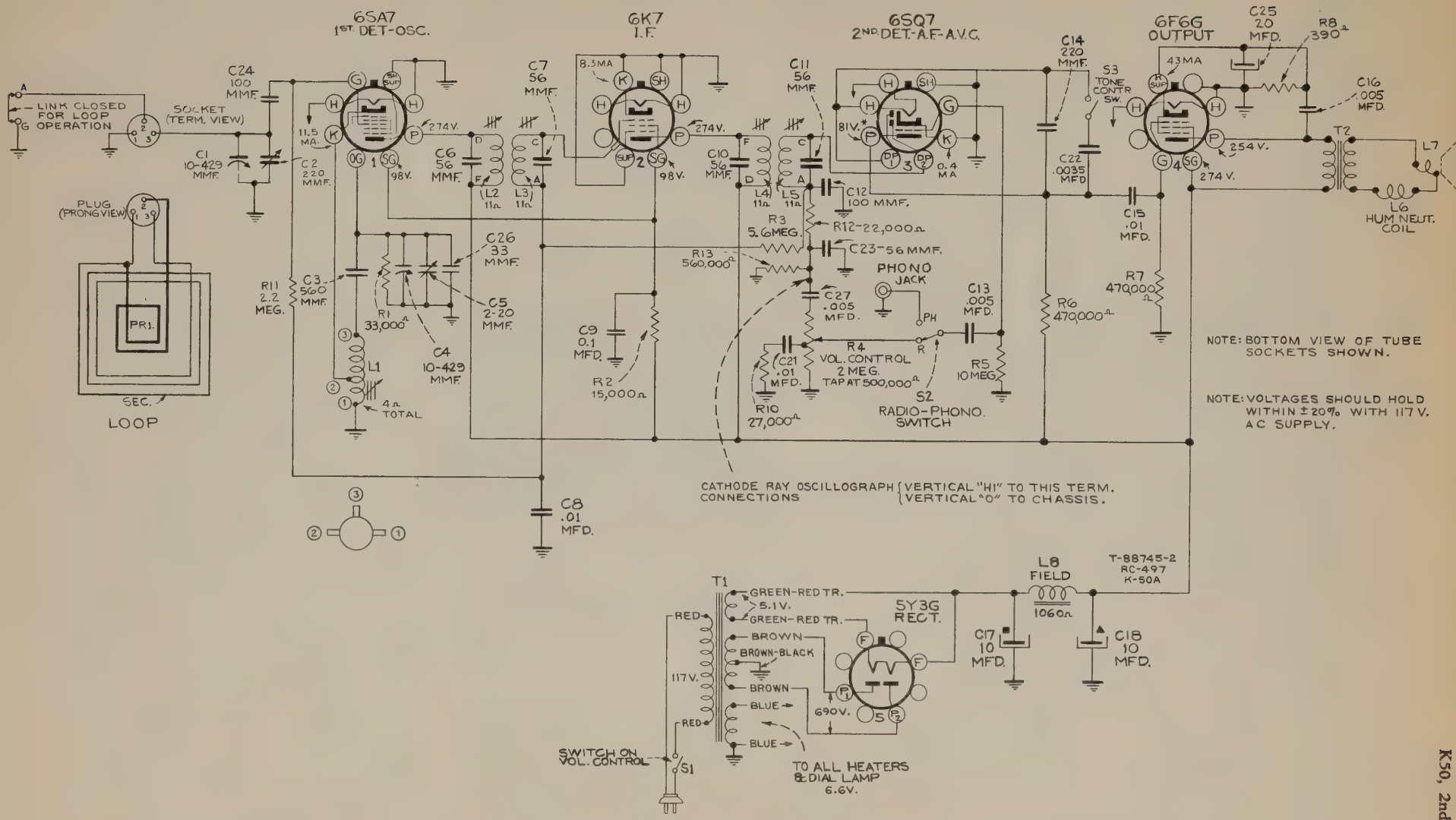




Loudspeaker Connections

Centering Loudspeaker Cone

To center the loudspeaker voice coil, first remove the front dust cover, then loosen the spider screws, insert three narrow feelers in the gap, and tighten the spider screws. Remove the feelers and fasten a dust cover in place with loudspeaker cement.



Schematic Circuit Diagram

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

2. Set the radio-phono switch to "radio" position and accurately tune in the station for which the first button is to be set.

3. Press in push-button rod No. 1 (left) with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Replace the push-button on its shaft.

5. Proceed in a similar manner for the remainder of the push-buttons.

6. Insert the station marker tabs in the recesses above the push-buttons.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-497)
33719	Belt—Adjusting belt for push button arms
34724	Board—Antenna-Ground board
33817	Capacitor—Mica trimmer comprising 1 section of 2-20 mmfd. (C2, C5)
12948	Capacitor—33 mmfd. (C26)
30949	Capacitor—56 mmfd. (C6, C7, C10, C11)
12723	Capacitor—56 mmfd. (C23)
12720	Capacitor—100 mmfd. (C12, C24)
12694	Capacitor—220 mmfd. (C14)
12537	Capacitor—560 mmfd. (C3)
30303	Capacitor—.0035 mfd. (C22)
33584	Capacitor—.005 mfd. (C13, C16, C27)
4937	Capacitor—.01 mfd. (C8, C15, C21)
4839	Capacitor—0.1 mfd. (C9)
32240	Capacitor—Electrolytic comprising 2 sections of 10 mfd. and 1 section of 20 mfd.
33724	Coil—Oscillator coil
33635	Condenser—6 button tuning condenser
33630	Control—Tone control
34796	Control—Volume control and power switch
32634	Cord—Drive cord
33633	Indicator—Station selector indicator
11765	Lamp—Dial lamp
34795	Plate—Dial plate complete less tuner and dial
5119	Plug—3 contact female plug for speaker cable
31388	Resistor—390 ohms, 1 watt (R8)
33489	Resistor—15,000 ohms, 2½ watt (R2)
13998	Resistor—22,000 ohms, ½ watt (R12)
12738	Resistor—27,000 ohms, ½ watt (R10)
12454	Resistor—33,000 ohms, ½ watt (R1)
12285	Resistor—470,000 ohms, ½ watt (R6, R7)
12486	Resistor—560,000 ohms, ½ watt (R13)
12679	Resistor—2.2 megohms, ½ watt (R11)
11668	Resistor—5.6 megohms, ½ watt (R3)
13601	Resistor—10 megohms, ½ watt (R5)
33735	Screw—Push button adjusting and locking screw
33725	Shaft—Drive shaft
34411	Shaft—Drive shaft
34723	Socket—Antenna loop socket
31364	Socket—Dial lamp socket
14278	Socket—Phonograph input socket and jack
31319	Socket—Tube socket
31418	Spring—Drive cord spring
33720	Spring—Push button arm return spring
33634	Switch—"Radio-Phono" switch
31575	Transformer—Power transformer (100-120 and 200-240) volt 50-60 cycle
33112	Transformer—Power transformer 105-125 volt, 50-60 cycle
33618	Transformer—Power transformer 110 volt, 25-60 cycle
32263	Transformer—1st I.F. transformer
34719	Transformer—2nd I.F. transformer
33726	Washer—"C" washer for drive shaft
	SPEAKER ASSEMBLIES (RL-70J2)
31825	Cap—Dust cap
11469	Coil—Neutralizing coil (L6)
33116	Coil—Speaker field coil (L8)
31275	Cone—Speaker cone and voice coil (L7)
5118	Plug—3 contact male connector plug
33779	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33731	Button—Push button
31456	Cover—Protective cover for push button markers
34801	Dial—Glass dial scale
33637	Escutcheon—Dial and push button escutcheon
30863	Knob—Tuning, tone control, or volume control knob
34800	Loop—Antenna loop
33973	Marker—Station markers
32641	Plug—3 prong male plug for antenna loop
30900	Spring—Retaining spring for knob Stock 30863 and Button Stock 33731

RCA Victor

MODEL K-60

Chassis No. RC-415

Six-Tube, Three-Band, AC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 29 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast	540-1,720 kc
Medium Wave	2.3-7.0 mc
Short Wave	7.0-22.0 mc
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SA7	1st Detector-Oscillator
(2) RCA-6SK7	I-F Amplifier
(3) RCA-6H6	2nd Detector, A.V.C.
(4) RCA-6SF5	A-F Amplifier
(5) RCA-6F6-G	Power Output
(6) RCA-5Y3-G	Rectifier

PILOT LAMPS (2) ... Mazda No. 44, 6.3 volts, 0.25 amp.

POWER OUTPUT RATING

Undistorted	2.5 watts
Maximum	4.5 watts

LOUDSPEAKER (RL-70H-6)

Type	12-inch electrodynamic
V.C. Impedance	2.2 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A.	105-125 volts, 50-60 cycles, 75 watts
Rating B.	105-125 volts, 25-60 cycles, 75 watts
Rating C.	100-130, 140-160, 195-250 volts, 40-60 cycles, 75 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	38	25½	12½
Chassis Base Dimensions (inches)	3¼	16⅜	8½
Over-all Chassis Height		7¼ inches	
Weight		60 lbs. (Shipping), 47 lbs. (Net)	
Tuning Drive Ratio		18 to 1	

Push Button Adjustment

The push-buttons should be adjusted for eight favorite stations after the receiver is operating, and has had a brief warm-up period.

Any standard broadcast stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-button screws in back of the station-marker recesses.
2. Set Accessory-Tone Knob to "Radio" and turn the range selector to "A."
3. Press in the tuning knob and accurately tune in the first station.
4. With station accurately tuned in, press in the first push-button and tighten the screw.
5. Place the station marker tab in the recess.
6. Proceed in a similar manner to adjust the remainder of the push-buttons.

First Edition

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

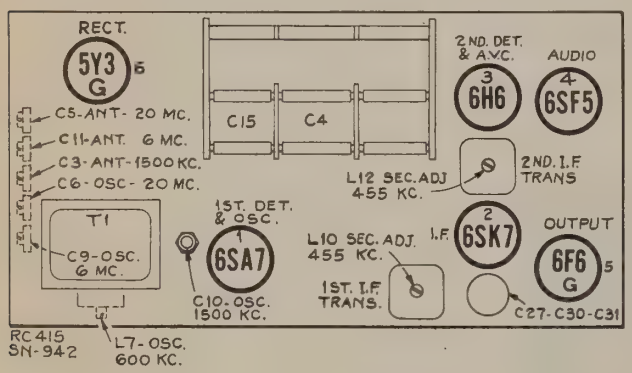
Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord-Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical and directly under the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

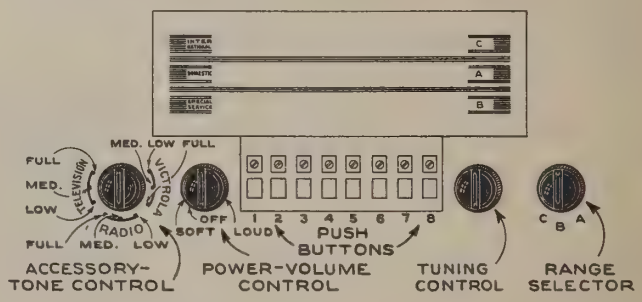


Steps	Connect the high side of the test-osc. to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 grid in series with .01 mfd.	455 kc	"A" Band Quiet Point between 550-750 kc	L11 and L12 (2nd I-F Trans.)
2	6SA7 grid in series with .01 mfd.			L9 and L10 (1st I-F Trans.)
3	Ant. terminal in series with 300 ohms	20 mc	20 mc (200°) "C" Band	C6 (osc.)* C5 (ant.)
4		6 mc	6 mc (187.5°) "B" Band	C9 (osc.)** C11 (ant.)
5	Ant. terminal in series with 200 mmfd.	1,500 kc	1,500 kc (198.25°) "A" Band	C10 (osc.) C3 (ant.)
6		600 kc	600 kc (39.75°) "A" Band	L7 (osc.) Rock Gang
7	Repeat step 5.			

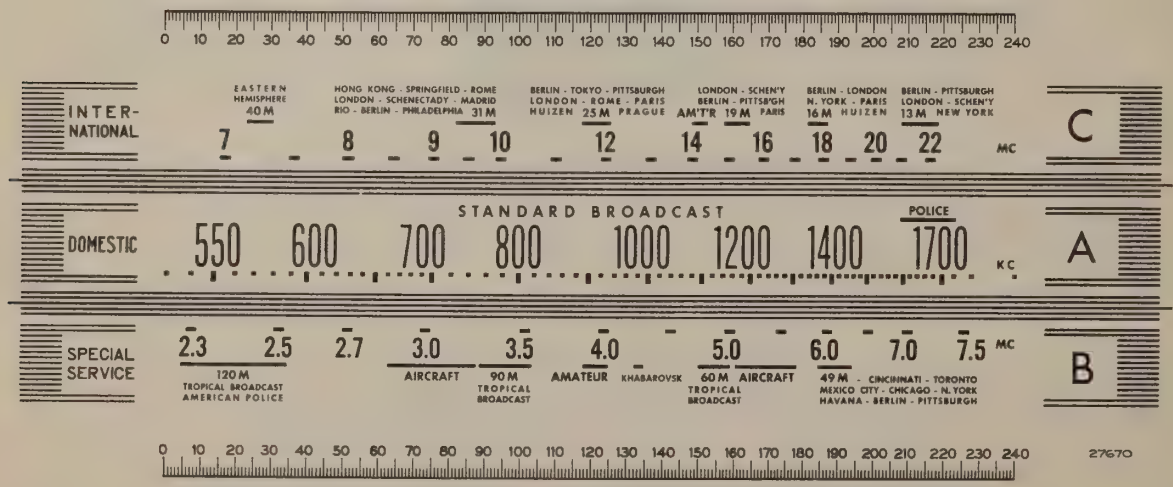
* Use **minimum** capacity peak if two can be obtained. Check to determine that C6 has been adjusted to correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

** Use **minimum** capacity peak if two can be obtained. Check to determine that C9 has been adjusted to correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

Note: Oscillator tracks above signal on all bands.

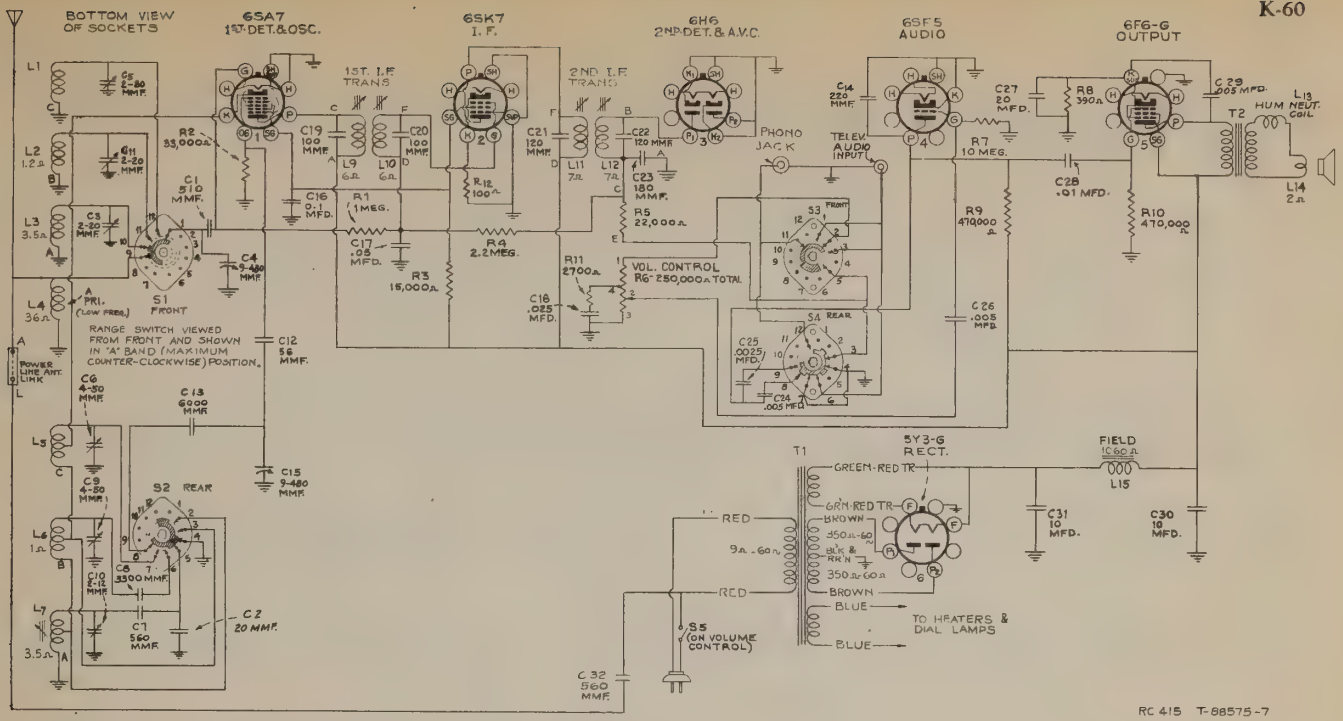


Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240
INTER-NATIONAL
EASTERN HEMISPHERE 40 M
HONG KONG - SPRINGFIELD - ROME
LONDON - SCHENECTADY - MADRID
RIO - BERLIN - PHILADELPHIA 31 M
BERLIN - TOKYO - PITTSBURGH
LONDON - ROME - PARIS
HUIZEN 25 M PRAGUE
LONDON - SCHEN'Y
BERLIN - PITTSB'GH
AM'T'R 19 M PARIS
BERLIN - LONDON
N. YORK - PARIS
16 M HUIZEN
BERLIN - PITTSBURGH
LONDON - SCHEN'Y
13 M NEW YORK
7 8 9 10 12 14 16 18 20 22 MC
C
DOMESTIC
STANDARD BROADCAST
POLICE
550 600 700 800 1000 1200 1400 1700 KC
A
SPECIAL SERVICE
2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 7.0 7.5 MC
120 M TROPICAL BROADCAST AMERICAN POLICE
AIRCRAFT
90 M TROPICAL BROADCAST
AMATEUR
KHABAROVSK
60 M TROPICAL BROADCAST
AIRCRAFT
49 M - CINCINNATI - TORONTO
MEXICO CITY - CHICAGO - N. YORK
HAVANA - BERLIN - PITTSBURGH
B
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240
27670

Receiver Dial Scales, and Corresponding 0-240° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example 39.75° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."



Note: On some receivers the following circuit modifications are in effect:

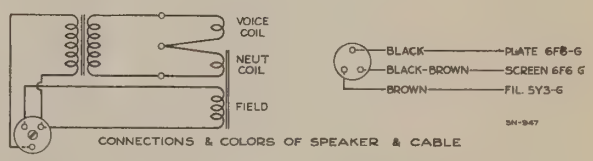
1. R11 is 4,700 ohms, and C18 is .05 mfd.
2. C1 is 470 mmfd.
3. There are three types of 2nd I-F transformers in use.

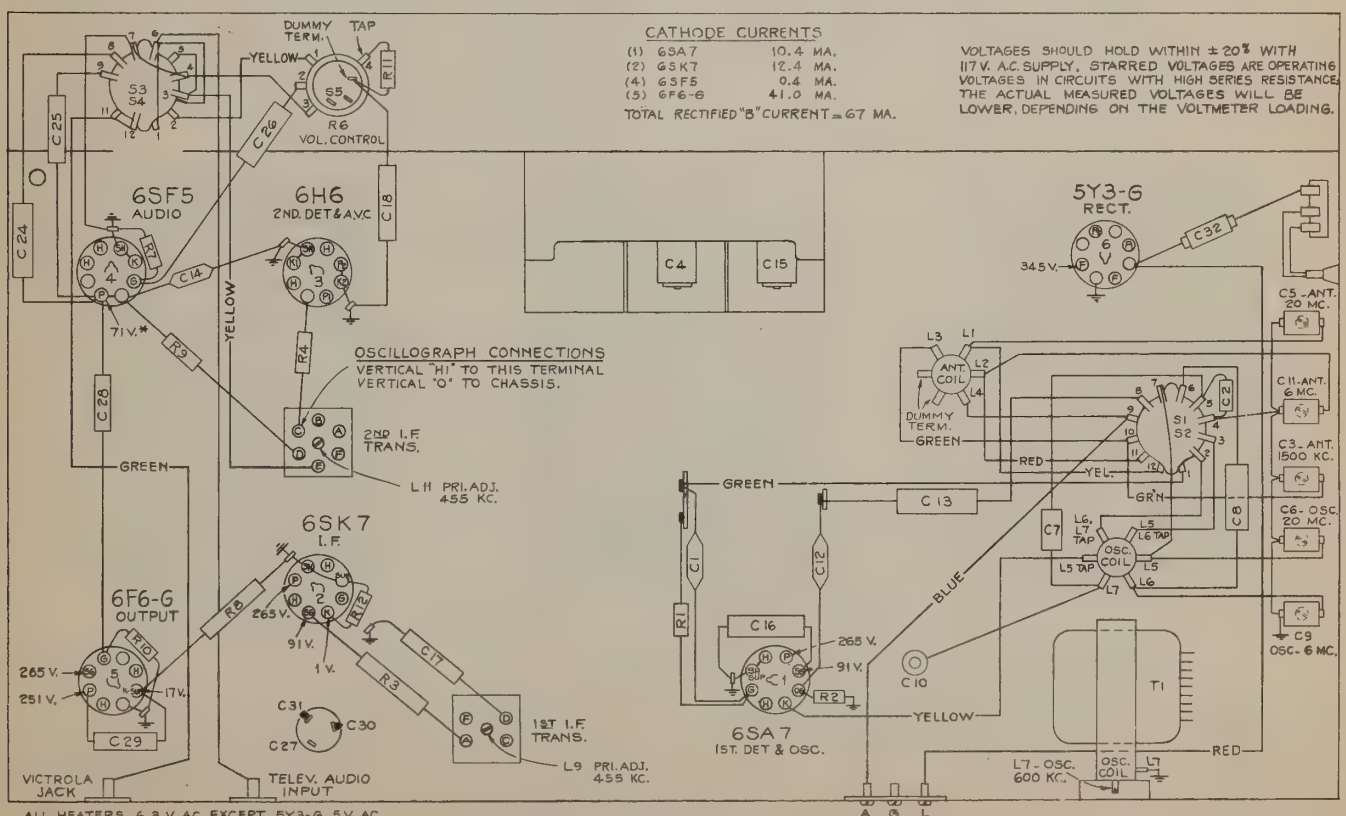
a. The first type (Stock No. 14308) has C23 and R5 mounted inside the case, and is connected exactly as shown above.

b. In the second type R5 is omitted and the lead from S4 connects to C instead of E. E is not used.

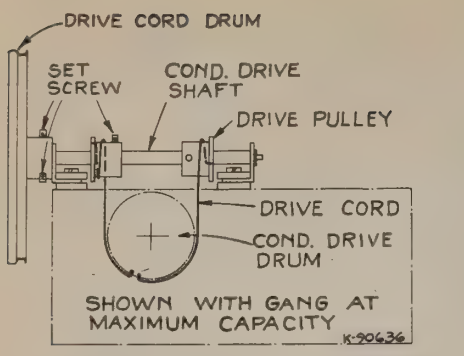
c. In the third type R5 is omitted and C23 is connected externally from C to ground. E is not used. The lead from the diode plate connects to A instead of B. When replacing this transformer with Stock No. 14308, remove the external C23 and connect the replacement transformer as shown in the above diagram.

Important: Stock No. 14308 is used as replacement for all three of the above types, and should be connected as shown in the diagram.

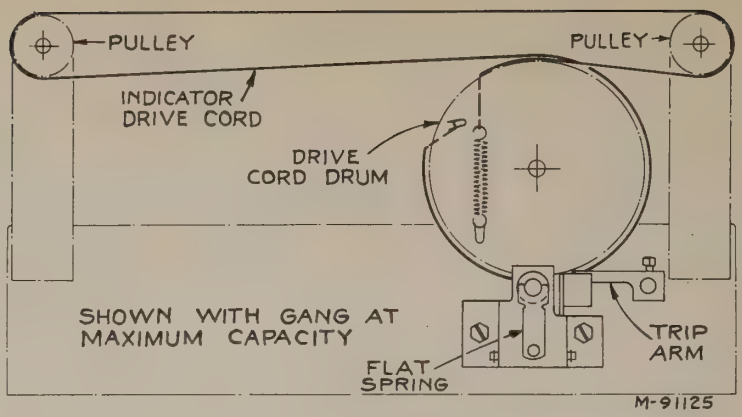




R-F WIRING & SOCKET VOLTAGES

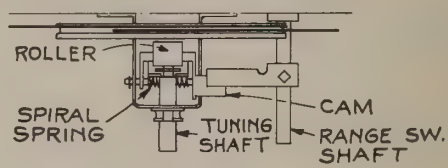


CONDENSER DRIVE CORD ARRANGEMENT



Note: In the Dial Indicator Drive Cord Assembly drawing at the right the mechanism is shown with the range switch in the "A" band position. In this position the trip arm on the range switch shaft must be adjusted so that when push-buttons are operated, the drive cord drum will turn freely without rubbing or binding against the drive roller.

DIAL INDICATOR DRIVE CORD ASSEMBLY.



Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-415)
33620	Arm—Push arm and cam assembly on tuning unit—less lock screw
33432	Arm—Trip arm and set screw located on range switch shaft
33430	Board—Antenna and ground terminal board
12714	Capacitor—Air-trimmer, 2-12 mmfd. (C10)
33429	Capacitor—Trimmer capacitor bank, 2 sections 4-50 mmfd., and 3 sections 2-20 mmfd. (C3, C5, C6, C9, C11)
31871	Capacitor—20 mmfd. (C2)
12723	Capacitor—56 mmfd. (C12)
30904	Capacitor—100 mmfd. (C19, C20)
12404	Capacitor—120 mmfd. (C21, C22)
14712	Capacitor—180 mmfd. (C23)
30232	Capacitor—220 mmfd. (C14)
30608	Capacitor—510 mmfd. (C1)
31433	Capacitor—560 mmfd. (C7)
12537	Capacitor—560 mmfd. (C32)
31403	Capacitor—3,300 mmfd. (C8)
31405	Capacitor—6,000 mmfd. (C13)
5107	Capacitor—.0025 mfd. (C25)
4838	Capacitor—.005 mfd. (C24, C26, C29)
4937	Capacitor—.01 mfd. (C28)
32787	Capacitor—.05 mfd., 400 V. (C17, C18)
4839	Capacitor—0.1 mfd. (C16)
32240	Capacitor—Electrolytic, 2 sections 10 mfd., one section 20 mfd. (C27, C30, C31)
32821	Coil—Antenna coil (L1, L2, L3, L4)
32824	Coil—Oscillator coil (L5, L6, L7)
33424	Control—Tone control (S3, S4)
33425	Control—Volume control and power switch (R6, S5)
32635	Cord—Condenser drive cord
32634	Cord—Indicator drive cord
32713	Core—Adjustable core and stud for oscillator coil
33627	Drum—Condenser drive drum
33174	Drum—Drive cord drum with set screws and calibrator dial
11891	Lamp—Dial lamp
33625	Plate—Front guide plate for push arms
5119	Plug—3-contact female for speaker cable
33427	Pulley—Drive cord pulley and mounting bracket
33626	Pulley—Drive pulley—less bronze drive cord
31388	Resistor—390 ohms, 1 watt (R8)
30146	Resistor—4,700 ohms, ½ watt (R11)
33489	Resistor—15,000 ohms, 2.5 watt (R3)
14284	Resistor—22,000 ohms, 1/10 watt (R5)
12454	Resistor—33,000 ohms, ½ watt (R2)
12285	Resistor—470,000 ohms, ½ watt (R9, R10)
13730	Resistor—1 meg., ½ watt (R1)
12679	Resistor—2.2 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R7)
30340	Retainer—Retainer for shaft of tuning shaft cam and arm
33419	Roller—Fricton roller for tuning knob shaft
4669	Screw—No. 8-32 square head set screw for drum
33621	Screw—Push arm lock screw
33624	Shaft—Tuning condenser drive shaft and washer
33422	Shaft—Tuning shaft—less friction roller
31364	Socket—Dial lamp socket
14278	Socket—Phonograph or Television input socket
31319	Socket—Tube socket
33175	Spring—Drive cord tension spring
33623	Spring—Drive drum cord spring
33622	Spring—Push arm return spring
33421	Spring—Tuning shaft flat spring
33420	Spring—Tuning shaft cam spiral spring
33426	Switch—Range switch (S1, S2)
33428	Transformer—First i-f transformer (L9, L10, C19, C20)
14308	Transformer—Second i-f transformer (L11, L12, C21, C22, C23, R5)
33618	Transformer—Power transformer—105-120 volts, 25 cycle (T1)
33112	Transformer—Power transformer—105-120 volts, 50-60 cycle (T1)
	SPEAKER ASSEMBLIES (RL-70H6)
31825	Cap—Cone center dust cap
11469	Coil—Hum neutralizing coil (L13)
33116	Coil—Speaker field coil (L15)
31275	Cone—Speaker cone, voice coil and dust cap (L14)
5118	Plug—3-contact male, for speaker
31301	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33474	Button—Push button
33437	Dial—Dial scale (glass)
33439	Escutcheon—Dial escutcheon—less push buttons
33436	Frame—Dial scale holder, mounting brackets, and pointer assembled—less dial
34383	Indicator—Dial pointer, carriage and clip
33434	Knob—Volume control, tone control, range switch, or station selector knob
33431	Link—Link for "Antenna-Ground" terminal board
33842	Marker—Station selectors call letter markers
34143	Shaft—Pointer carriage slide rod
14270	Spring—Retaining spring for knob

RCA Victor

MODELS K-60, K-80, and K-81

Chassis No. RC-415B, RC-415C, RC-415D, and RC-415C

Three-Band, A-C, Loop, Superheterodynes

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Service information for Models K-60 (RC-415) and K-80 (RC-415A) **without loop** antenna, is published in Service Data sheets numbered "1939-No. 29" and "1939-No. 30" respectively.

Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast	540-1,560 kc
Medium Wave	1.52-4.0 mc
Short Wave	5.8-18.0 mc
INTERMEDIATE FREQUENCY	455 kc

MODEL K-60 (RC-415B)

TUBE COMPLEMENT

(1) RCA-6SA7	1st Detector-Oscillator
(2) RCA-6K7	I-F Amplifier
(3) RCA-6H6	2nd Detector, A.V.C.
(4) RCA-6SF5	A-F Amplifier
(5) RCA-6F6-G	Power Output
(6) RCA-5Y3-G	Rectifier

POWER OUTPUT RATING

Undistorted	2.5 watts
Maximum	4.5 watts

LOUDSPEAKER (RL-70H-6)

Type	12-inch electrodynamic
V.C. Impedance	2.2 ohms at 400 cycles

POWER CONSUMPTION

Watts	75

MODELS K-80, K-81

TUBE COMPLEMENT

(1) RCA-6SA7	1st Detector-Oscillator
(2) RCA-6K7	I-F Amplifier
(3) RCA-6SQ7	2nd Detector, A.V.C., and A-F Amplifier
(4) RCA-6SF5	Inverter
(5) RCA-6F6-G	Power Output
(6) RCA-6F6-G	Power Output
(7) RCA-5Y3-G	Rectifier
RCA-6U5/6G5 (K-80 and K-81)	Tuning Indicator
PILOT LAMPS (2)	Mazda No. 44, 6.3 volts, 0.25 amp.

POWER OUTPUT RATING

Undistorted	5.0 watts
Maximum	5.5 watts

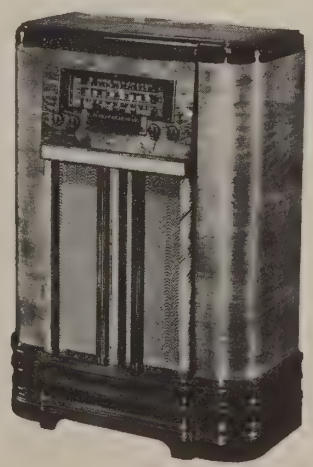
LOUDSPEAKER (RL-70J-1)

Type	12-inch electrodynamic
V.C. Impedance	2.2 ohms at 400 cycles

POWER CONSUMPTION

Watts	85

Model K-60



Model K-80

Model K-81

Cabinet Dimensions (inches)	Model K-60	Model K-80	Model K-81
Height	38	42⅜	42⅜
Width	25½	28	30⅜
Depth	12½	14¾	15-5/16
Weight (pounds, net)	47	61	67
Tuning Drive Ratio			18 to 1

Trademarks "Victrola," "RCA Victor," "Victor," "Magic Eye" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

First Edition

Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

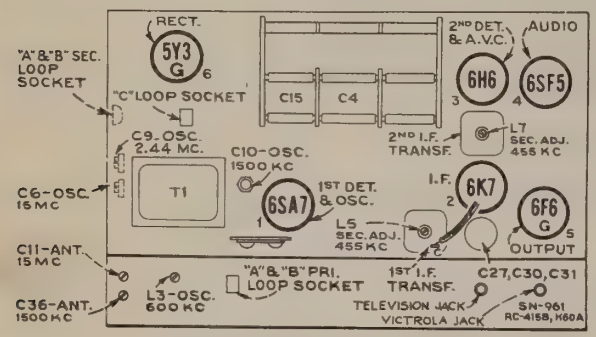
Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord-Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference when the chassis is removed; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical and directly under the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

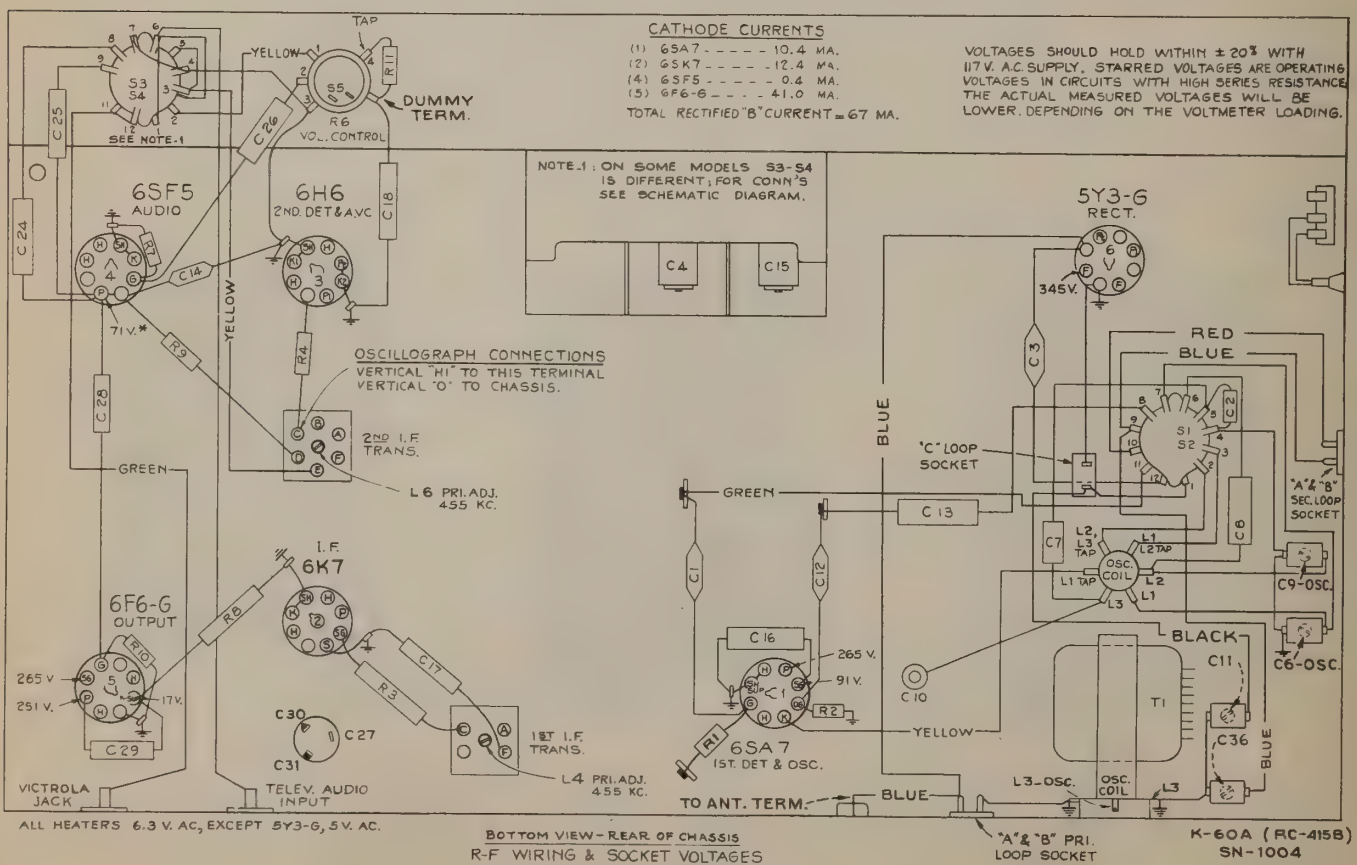


Model K-60 (RC-415B)

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Steps	Connect test-osc. output to—	Tune test-osc. to—	Turn radio dial to	Adjust the following for maximum peak output
1	1st-det. grid, in series with .01 mfd.	455 kc	"C" band quiet point	L6 and L7 (2nd I-F trans.) L4 and L5 (1st I-F trans.)
2		15 mc	191° "C" band	C6 (osc.)*
3		2.44 mc	115° "B" band	C9 (osc.)
4	Fasten chassis in cabinet, see that link is closed on the antenna board, attach dial indicator to drive cord, with indicator at 530 kc mark and gang at maximum capacity.			
5	Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver	15 mc	15 mc signal "C" band	C11 Rock gang
6		6.0 mc	6.0 mc signal "C" band	"C" loop leads**
7		Repeat step 5		
8		600 kc	600 kc "A" band	L3 (osc.) Rock gang
9		1,500 kc	1,500 kc "A" band	C10 (osc.) C36 (loop)
10		Repeat steps 8 and 9		
11		2.44 mc	2.44 kc "B" band	C9 (osc.) Rock gang

* Use minimum capacity peak if two peaks can be obtained.
** Adjust spacing between two leads from "C" band loop.
NOTE: Oscillator tracks above signal on all bands.



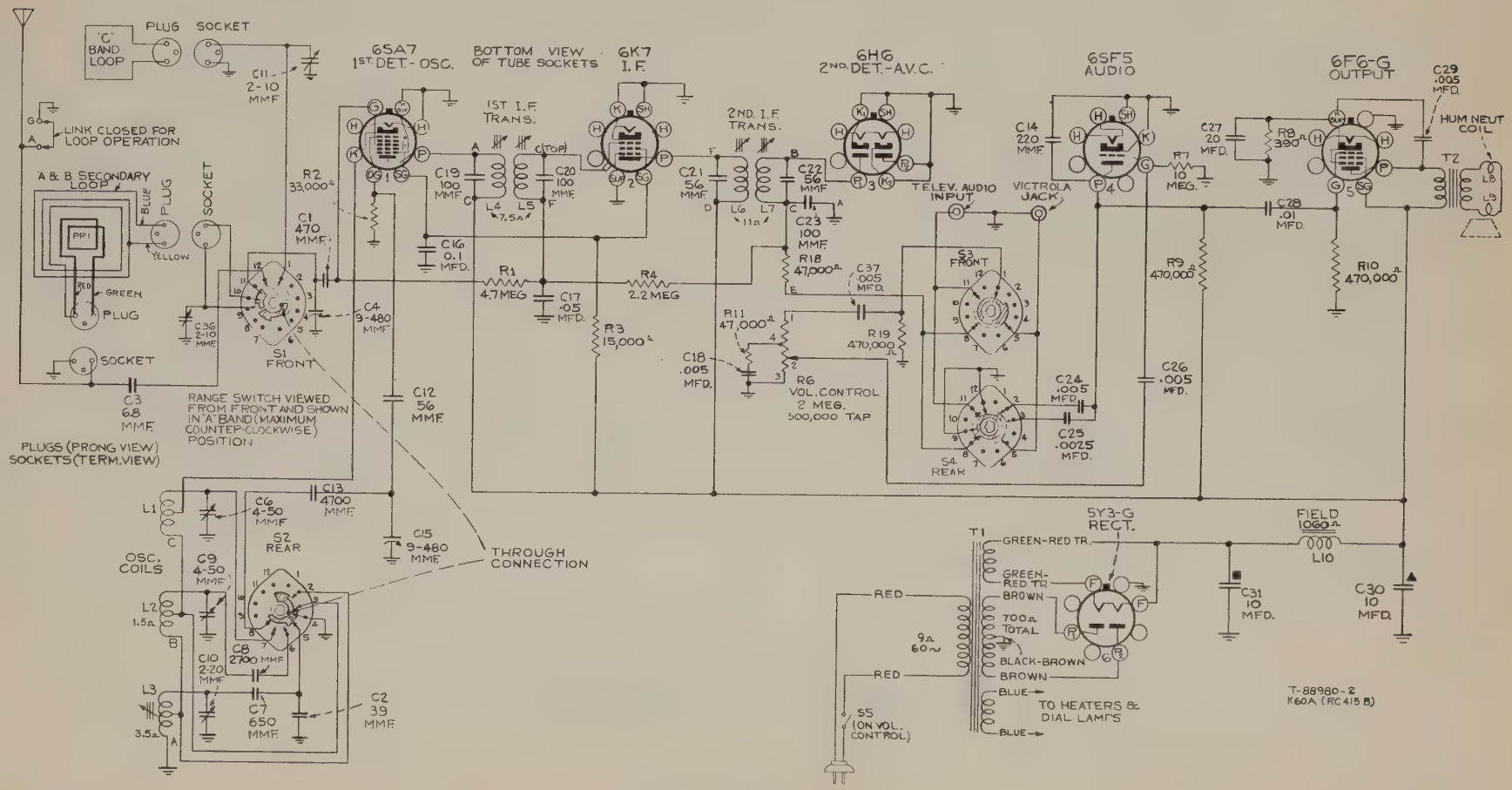
Model K-60 (RC-415B)

Push Button Adjustment

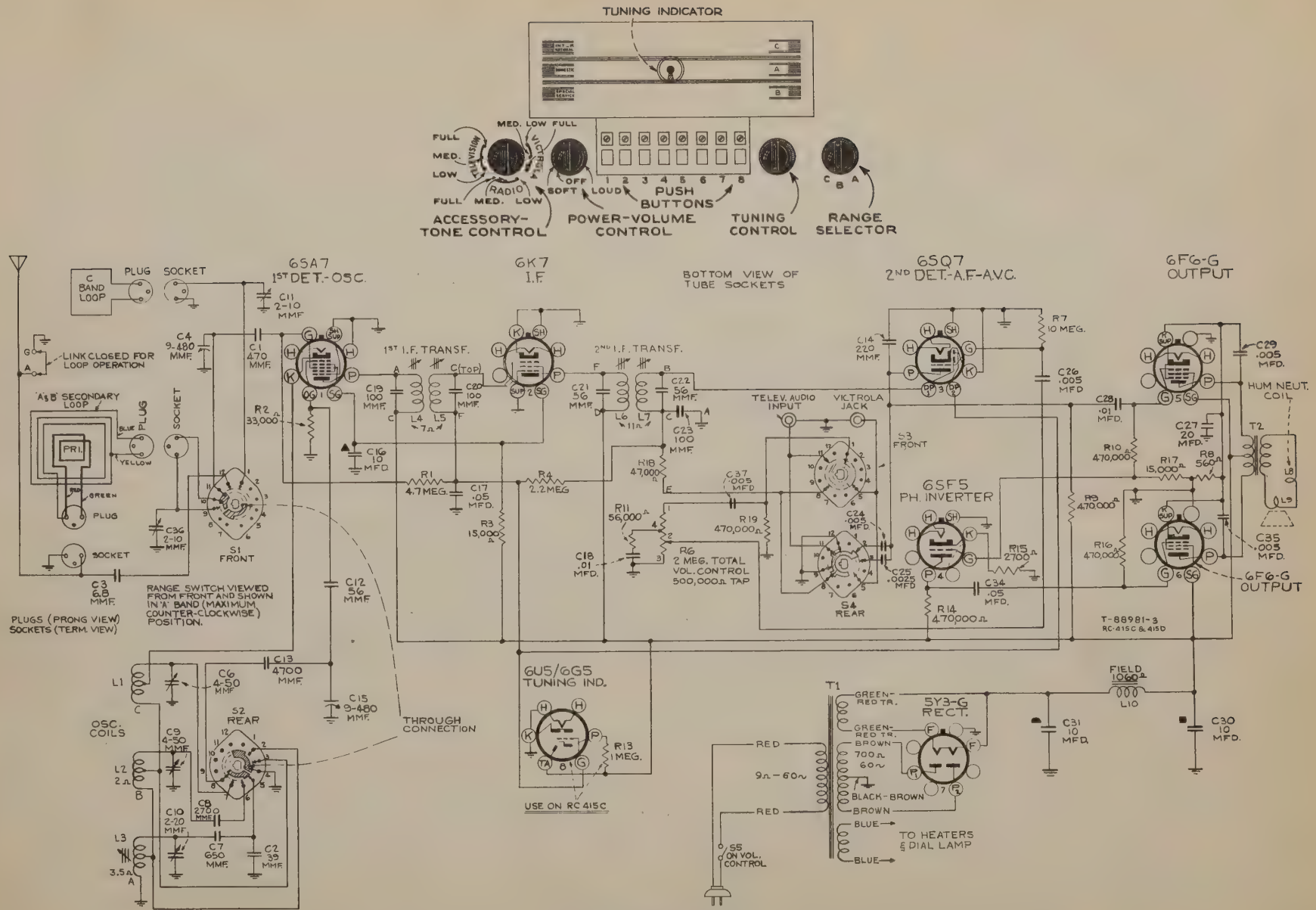
The push-buttons should be adjusted for eight favorite stations after the receiver is operating, and has had a brief warm-up period.

Any standard broadcast stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-button screws in back of the station-marker recesses.
2. Set Accessory-Tone Knob to "Radio" and turn the range selector to "A."
3. Press in the tuning knob and accurately tune in the first station.
4. With station accurately tuned in, press in the first push-button and tighten the screw.
5. Place the station marker tab in the recess.
6. Proceed in a similar manner to adjust the remainder of the push-buttons.

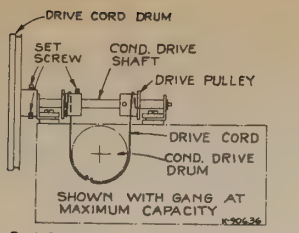


Model K-60 (RC-415B)



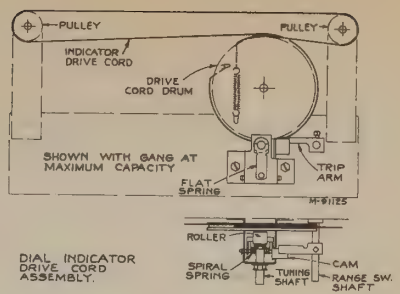
Models K-80 and K-81

(The Tuning Indicator is not used in RC-415D)

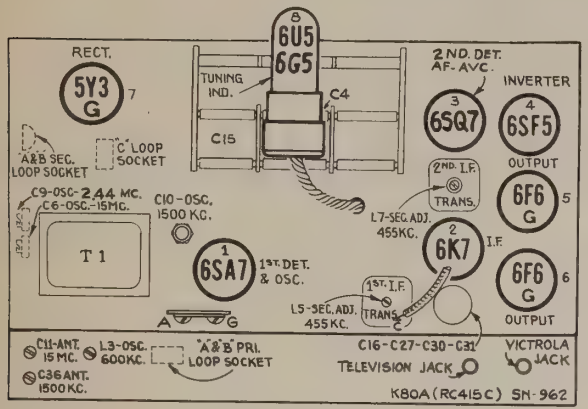


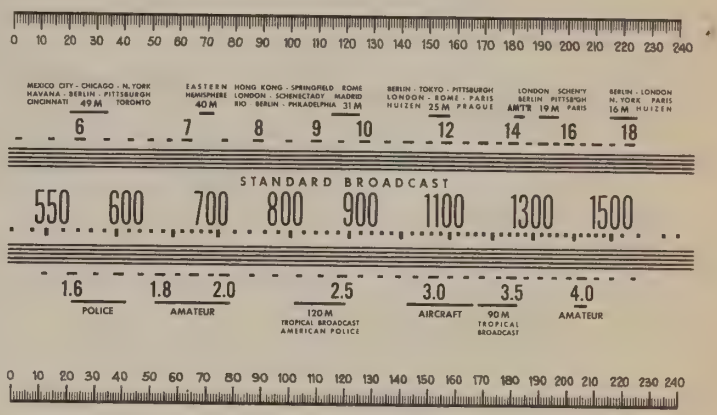
CONDENSER DRIVE CORD ARRANGEMENT

Note: In the Dial Indicator Drive Cord Assembly drawing the mechanism is shown with the **range switch in the "A" band position.** In this position the trip arm on the range shaft must be adjusted so that when the push-buttons are operated, the drive cord drum will turn freely without rubbing or binding against the drive roller.



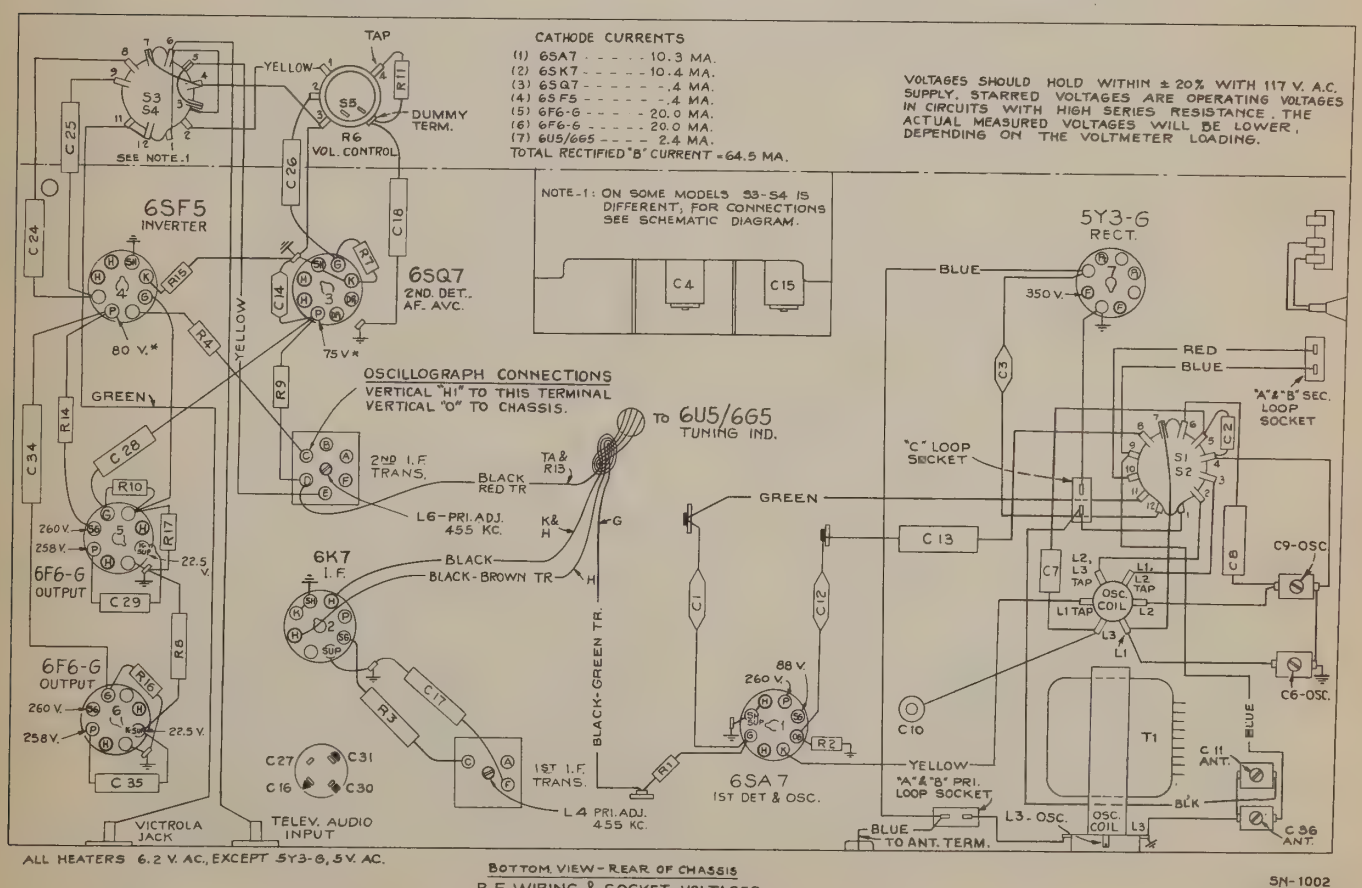
Tuning Mechanism in Models K-60, K-80, and K-81




0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240
MEXICO CITY - CHICAGO - N.YORK HAVANA - BERLIN - PITTSBURGH CINCINNATI 49 M TORONTO
EASTERN HEMISPHERE 40 M HONG KONG - SPRINGFIELD ROME LONDON - SCHENECTADY MADRID RIO BERLIN - PHILADELPHIA 31 M
BERLIN - TOKYO - PITTSBURGH LONDON - ROME - PARIS HUIZEN 25 M PRAGUE
LONDON SCHEN'Y BERLIN PITTSBURGH AM'TR 19 M PARIS
BERLIN - LONDON N. YORK PARIS 16 M HUIZEN
6 7 8 9 10 12 14 16 18
STANDARD BROADCAST
550 600 700 800 900 1100 1300 1500
1.6 POLICE
1.8 2.0 AMATEUR
2.5 120 M TROPICAL BROADCAST AMERICAN POLICE
3.0 AIRCRAFT
3.5 90 M TROPICAL BROADCAST
4.0 AMATEUR

Models K-80, K-81

Calibration Scale


CATHODE CURRENTS
(1) 6SA7 - - - - 10.3 MA.
(2) 6SK7 - - - - 10.4 MA.
(3) 6SQ7 - - - - .4 MA.
(4) 6SF5 - - - - .4 MA.
(5) 6F6-G - - - 20.0 MA.
(6) 6F6-G - - - 20.0 MA.
(7) 6U5/6G5 - - - 2.4 MA.
TOTAL RECTIFIED "B" CURRENT = 64.5 MA.
VOLTAGES SHOULD HOLD WITHIN ± 20% WITH 117 V. A.C. SUPPLY. STARRED VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE. THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.
NOTE-1: ON SOME MODELS S3-S4 IS DIFFERENT, FOR CONNECTIONS SEE SCHEMATIC DIAGRAM.
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL
VERTICAL "O" TO CHASSIS.
6SF5 INVERTER
6SQ7 2ND. DET., AF. AVC.
6K7 I.F.
6F6-G OUTPUT
6SA7 1ST DET & OSC.
5Y3-G RECT.
TAP
DUMMY TERM.
R6 VOL. CONTROL
2ND I.F. TRANS.
1ST I.F. TRANS.
TO 6U5/6G5 TUNING IND.
"A" & "B" SEC. LOOP SOCKET
"C" LOOP SOCKET
"A" & "B" PRI. LOOP SOCKET
C9-OSC
C6-OSC.
C11 ANT.
C36 ANT.
L3-OSC.
OSC. COIL
VICTROLA JACK
TELEV. AUDIO INPUT
BLUE TO ANT. TERM.
ALL HEATERS 6.2 V. AC., EXCEPT 5Y3-G, 5 V. AC.

BOTTOM VIEW - REAR OF CHASSIS

R-F WIRING & SOCKET VOLTAGES

SN-1002
RC-415C-K80A

Models K-80 (RC-415C, RC-415D), and K-81 (RC-415C)

** The Tuning Indicator is not used in RC-415D*

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
33620	Arm—Push arm and cam assembly on tuning unit —less lock screw
33432	Arm—Trip arm and set screw located on range switch shaft
34574	Board—"Ant.-Grd." terminal board
12581	Cap—i-f transformer shield cap
30766	Cap—Rubber cap for Magic Eye — Models K-80, K-81
34573	Capacitor—Trimmer, 2 sections 2-10 mmfd. each
34572	Capacitor—Trimmer, 2 sections 4-50 mmfd. each
12714	Capacitor—Air-trimmer, 2-12 mmfd. (C10)
14079	Capacitor—6.8 mmfd. (C3)
34580	Capacitor—39 mmfd. (C2)
12723	Capacitor—56 mmfd. (C12)
30949	Capacitor—56 mmfd. (C21, C22)
30904	Capacitor—100 mmfd. (C19, C20)
30232	Capacitor—220 mmfd. (C14)
30433	Capacitor—470 mmfd. (C1)
34581	Capacitor—650 mmfd. (C7)
30057	Capacitor—2,700 mmfd. (C8)
31399	Capacitor—4,700 mmfd. (C13)
5107	Capacitor—.0025 mfd. (C25)
33584	Capacitor—.005 mfd. (C18—Model K-60 only), (C35 — Models K-80, K-81), (C37 — All Models)
4838	Capacitor—.005 mfd. (C24, C26, C29)
4937	Capacitor—.01 mfd. (C18—Models K-80, K-81), (C28—All Models)
32787	Capacitor—.05 mfd. (C34—Models K-80, K-81), (C17—All Models)
4839	Capacitor—0.1 mfd. (C16) (Model K-60 only)
32786	Capacitor—0.1 mfd.
32240	Capacitor—Electrolytic, 2 sections 10 mfd., one section 20 mfd. (C27, C30, C31) (Model K-60 only)
33014	Capacitor—Electrolytic, 3 sections 10 mfd., one section 20 mfd. (C16, C27, C30, C31) (K-80, K-81)
34579	Coil—Oscillator coil
34578	Control—Tone control
34695	Control—Volume control and power switch
32635	Cord—Condenser drive cord
32634	Cord—Drive cord
32713	Core—Adjustable core and stud for oscillator coil
33627	Drum—Condenser drive drum
33174	Drum—Drive cord drum with set screws and calibrator dial
33625	Plate—Front guide plate for push arms
5119	Plug—3-contact female for speaker cable (Model K-60-A only)
5040	Plug—4-contact female for speaker cable (Models K-80, K-81)
33427	Pulley—Drive cord pulley and mounting bracket
33626	Pulley—Drive pulley—less bronze drive cord
31388	Resistor—390 ohms, 1 watt (R8) (Model K-60 only)
30735	Resistor—560 ohms, 1 watt (R8) (Models K-80, K-81)
14024	Resistor—2,700 ohms, ½ watt (R11, R15) (Models K-80, K-81)
12695	Resistor—15,000 ohms, ½ watt (R17) (Models K-80, K-81)
33489	Resistor—15,000 ohms, 2.5 watt (R3)
12454	Resistor—33,000 ohms, ½ watt (R2)
5132	Resistor—47,000 ohms, 1/10 watt
12412	Resistor—47,000 ohms, ½ watt (R11) (Model K-60 only)
12286	Resistor—56,000 ohms, ½ watt (R11) (Models K-80, K-81)
12285	Resistor—470,000 ohms, ½ watt
12013	Resistor—1 meg., 1/10 watt (R13) (Models K-80, K-81)
12679	Resistor—2.2 meg., ½ watt (R4)
30271	Resistor—4.7 meg., ½ watt (R1)
13601	Resistor—10 meg., ½ watt (R7)
30340	Retainer—Retainer for shaft of tuning shaft cam and arm
33419	Roller—Friction roller for tuning knob shaft
4669	Screw—No. 8-32 square head set screw for drum
33621	Screw—Push arm lock screw
33624	Shaft—Tuning condenser drive shaft and washer
33422	Shaft—Tuning shaft—less friction roller
34575	Socket—3-contact female, for loop input
31364	Socket—Dial lamp socket
13871	Socket—Magic Eye tube socket (Models K-80, K-81)
14278	Socket—Phonograph or Television input socket
31319	Socket—Tube socket
33175	Spring—Drive cord tension spring
33623	Spring—Drive drum cord spring
33622	Spring—Push arm return spring
33421	Spring—Tuning shaft flat spring
33420	Spring—Tuning shaft cam spiral spring
34577	Switch—Range switch
14376	Transformer—First i-f transformer
32825	Transformer—Second i-f transformer
33618	Transformer—Power transformer—105-120 volts, 25-60 cycle (T1)
33112	Transformer—Power transformer—105-120 volts, 50-60 cycle (T1)
	SPEAKER ASSEMBLIES (K-60) (RL-70H6)
31825	Cap—Cone center dust cap
11469	Coil—Hum neutralizing coil
33116	Coil—Speaker field coil
31275	Cone—Speaker cone, voice coil and dust cap
5118	Plug—3-contact male, for speaker
31301	Transformer—Output transformer (T2)
	SPEAKER ASSEMBLIES (K-80, K-81, (RL-70J1)
31825	Cap—Cone center dust cap
11469	Coil—Hum neutralizing coil
33116	Coil—Speaker field coil
31275	Cone—Speaker cone, voice coil and dust cap
5039	Plug—4 prong male, for speaker
33444	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33474	Button—Push button (K-60, K-80)
34994	Button—Push button (K-81)
34992	Cap—Spindle cap for antenna loop (K-81)
30716	Clip—Magic Eye clip K-80)
34582	Dial—Dial scale (glass) (K-60, K-80)
34997	Dial—Dial scale (glass) (K-81)
33439	Escutcheon—Dial escutcheon—less push buttons (K-60, K-80)
34993	Escutcheon—Dial scale and push button escutcheon (K-81)
34996	Frame—Dial frame complete with brackets—*less* pointer guide rods, pointer and carriage, dial scale and Magic Eye clip (K-81)
34583	Frame—Frame only for "C" band loop—less wire and plug
34383	Indicator—Dial pointer, carriage, and clip
34998	Knob—Tuning, tone control, range switch, volume control and power switch or antenna loop shaft knob (K-81)
33434	Knob—Volume control, tone control, range switch or station selector knob (K-60, K-80)
34988	Loop—"A" and "B" band loop complete for K-60
34991	Loop—"A" and "B" band antenna loop complete (K-81)
33842	Marker—Station selector markers
34872	Pin—Complete set of dowel pins for antenna loop (K-60, K-80)
34990	Plug—2-prong male plug for antenna loop—"C" band (K-81)
32641	Plug—3-prong male plug for "A" and "B" band antenna loop
31482	Screw—No. 8-32 square head set screw (K-81)
33438	Screw—Thumb screw for Magic Eye clip (K-60, K-80)
34995	Shaft—Flexible shaft for antenna loop (K-81)
34491	Shaft—Pointer and carriage guide rods (K-81)
14270	Spring—Retaining spring for knob

RCA Victor

MODELS T-60 and T-62

Chassis No. RC-425 RC-425D

Six-Tube, Two-Band, AC, Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 37 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast	540-1,720 kc
Short Wave	5.6-20 mc
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SA7 ..... 1st. Detector-Oscillator
(2) RCA-6SK7 ..... I-F Amplifier
(3) RCA-6SQ7. 2nd. Detector, A.V.C., and A-F Amplifier
(4) RCA-6F6-G ..... Power Output
(5) RCA-6U5/6G5 ..... Tuning Indicator
(6) RCA-5Y3-G ..... Rectifier

PILOT LAMP (1) .....Mazda No. 51, 6.3 volts, 0.20 amp.

POWER OUTPUT RATING

Undistorted	2.2 watts
Maximum	4.2 watts

LOUDSPEAKER (T-60, RL-78-6; T-62, RL-79A-4)

Type	T-60, 5-inch electrodynamic; T-62, 6-inch electrodynamic
V. C. Impedance	3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 80 watts
Rating B	105-125 volts, 25-60 cycles, 80 watts
Rating C	100-130, 140-160, 195-250 volts, 40-60 cycles, 80 watts

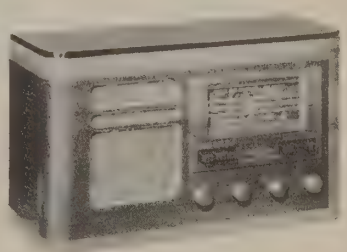
Mechanical Specifications

	T-60	T-62
Cabinet Dimensions (inches)	9⅝ x 16 x 7	10⅜ x 19 x 8 9/16
Chassis Base Dimensions (inches)		12⅛ x 5¾ x 2¼
Over-all Chassis Height		6⅞ inches
Weight	19 lbs. (Shipping)	21 lbs. (Shipping)
Tuning Drive Ratio		10 to 1

Model T-62

Power Line Antenna

Each of these models is equipped with a built-in power line antenna. To use this antenna, the link on the antenna terminal board should be connected between "A" and "L", thus connecting the antenna input of the receiver through a capacitor to the powerline. If an outside antenna is used, it should be connected to "A", a ground connection made to "G", and the link removed.



Model T-60

First Edition

Trademarks "Victrola," "Magic Eye" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

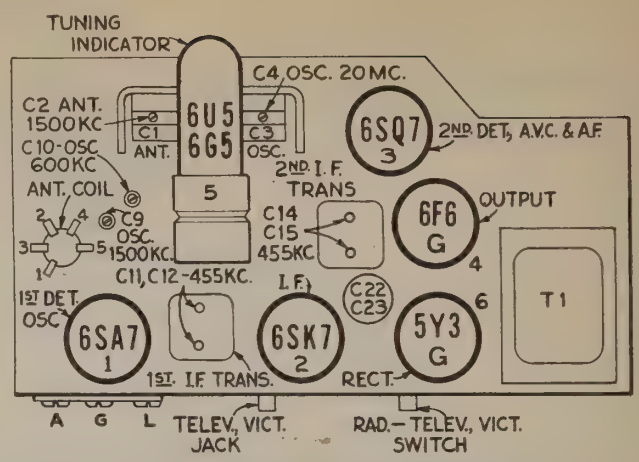
Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid A.V.C. action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks corresponding to dial readings of 600 kc, 1,500 kc, 6.1 mc, and 20 mc have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

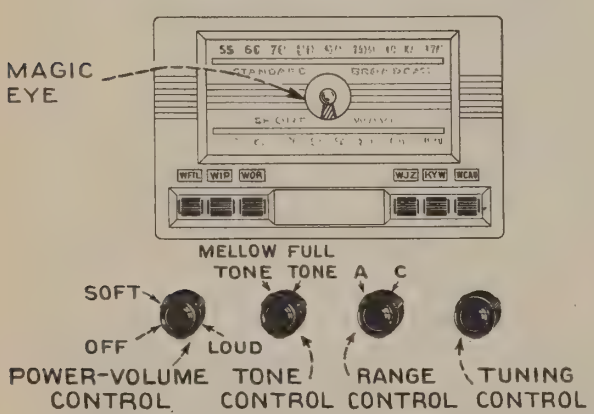
Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the mark at the extreme left (low frequency) end of the dial scale.

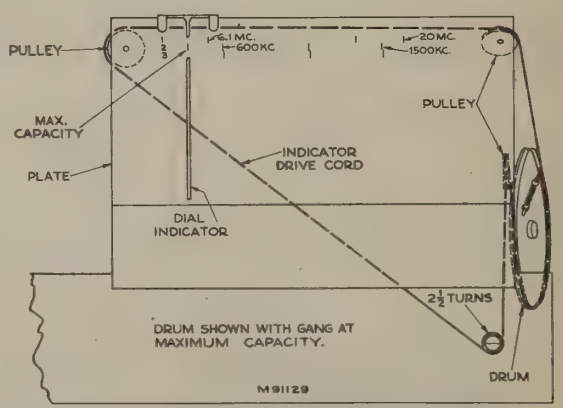


Steps	Connect the high side of the test osc. to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Antenna terminal	455 kc	"A" Band Quiet point between 550-750 kc	C14 and C15 (2nd I-F trans.)
2				C11 and C12 (1st I-F trans.)
3	Antenna terminal in series with 300 ohms	20 mc	"C" Band 20 mc calibration mark	C4 (osc.)*
4	Antenna terminal in series with 200 mmf.	1,500 kc	"A" Band 1,500 kc calibration mark	C9 (osc.) C2 (ant.)
5		600 kc	"A" Band 600 kc calibration mark	C10 (osc.) Rock gang
6	Repeat step 4			

* Use **minimum** peak if two can be obtained. Check to determine that C4 has been adjusted properly by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

Note: Oscillator tracks **above** signal on both bands.





DIAL MECHANISM AND CALIBRATION MARKS.

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

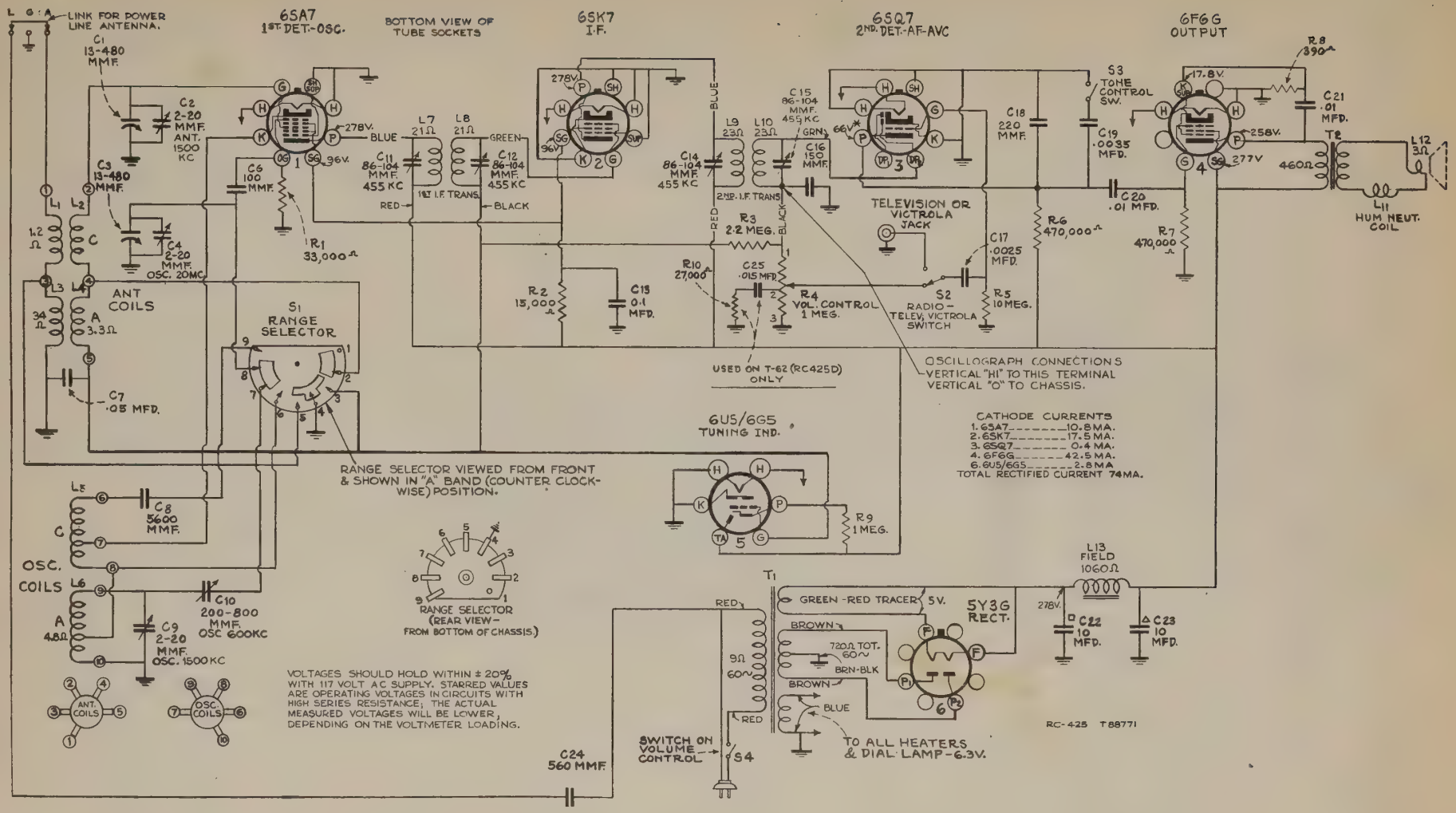
2. Turn the accessory switch on the back apron of the chassis to "Radio" position and accurately tune in the station for which the first button is to be set.

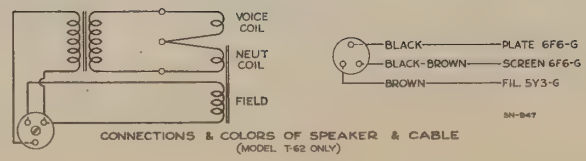
3. Press in the first push-button rod (left) with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Replace the push-button on its shaft.

5. Proceed in a similar manner for the remainder of the push-buttons.

6. Insert the station marker tabs in the recesses above the push-buttons.





CONNECTIONS & COLORS OF SPEAKER & CABLE
(MODEL T-62 ONLY)

Precautionary Lead Dress.—

1. Dress the Power Line Antenna lead close to the chassis base and near the back flange.
2. Power switch leads should be dressed around the 6SQ7 socket.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
	T-60 (RC-425)
	T-62 (RC-425-D)
33719	Belt—Tuning unit push arm belt
33718	Board—Antenna-ground board
30766	Cap—Rubber cap for tuning tube
12720	Capacitor—100 mmfd. (C6)
12725	Capacitor—150 mmfd. (C16)
12694	Capacitor—220 mmfd. (C18)
12537	Capacitor—560 mmfd. (C24)
13895	Capacitor—5,600 mmfd. 500 volt (C8)
33629	Capacitor—Trimmer capacitor, one section 2-20 mmfd. and one section 300-800 mmfd. (C9, C10)
30303	Capacitor—.0035 mfd. (C19)
5107	Capacitor—.0025 mfd. (C17)
11315	Capacitor—.015 mfd. (C25) Model T-62
32787	Capacitor—.05 mfd. (C7)
4937	Capacitor—.01 mfd. (C20, C21)
4839	Capacitor—0.1 mfd. (C13)
32342	Capacitor—Comprising 2 sections, 10 mfd. each (C22, C23)
33732	Coil—Antenna coil (L1, L2, L3, L4)
33733	Coil—Oscillator coil (L5, L6)
33631	Control—Volume control and power switch (R4, S4) Model T-60
33776	Control—Volume control and power switch (R4, S4) Model T-62
32634	Cord—Braided silk drive cord
33633	Indicator—Station selector indicator pointer
11765	Lamp—Pilot lamp
33734	Plate—Dial plate assembly mounting on condenser
5119	Plug—3 contact female for speaker cable Model T-62
12261	Resistor—390 ohms, ½ watt (R8)
33489	Resistor—15,000 ohms, 2½ watt (R2)
12738	Resistor—27,000 ohms, ½ watt (R10) Model T-62
12454	Resistor—33,000 ohms, ½ watt (R1)
12285	Resistor—470,000 ohms, ½ watt (R6, R7)
12013	Resistor—1 megohm 1/10 watt (R9)
12679	Resistor—2.2 megohms, ½ watt (R3)
13601	Resistor—10 megohm, ½ watt (R5)
33735	Screw—Push button lock screw
33725	Shaft—Tuning drive shaft
13871	Socket—Magic Eye socket
14278	Socket—Single contact socket and plate
31319	Socket—Tube base socket
31364	Socket—Pilot lamp socket
33720	Spring—Push arm return spring
33630	Switch—Tone control (S3)
33632	Switch—Range switch (S1)
33634	Switch—Radio phonograph switch (S2)
33722	Transformer—First i-f transformer (L7, L8, C11, C12)
33723	Transformer—Second i-f transformer (L9, L10, C14, C15)
33619	Transformer—Power transformer—105/125 volts, 25/60 cycles (T1)
33112	Transformer—Power transformer—105/125 volts, 50/60 cycles (T1)
31575	Transformer — Power transformer — 105/125, 200/250 volts, 50/60 cycle (T1)
	SPEAKER ASSEMBLIES
	(RL-78-6) Model T60
32907	Cap—Cone center dust cap
32906	Coil—Hum neutralizing coil (L11)
33601	Coil—Speaker field coil (L13)
32904	Cone—Speaker cone and voice coil (L12)
32905	Transformer—Output transformer (T2)
	SPEAKER ASSEMBLIES
	(RL-79A-4) Model T62
32907	Cap—Cone center dust cap
32906	Coil—Neutralizing coil (L11)
33601	Coil—Speaker field coil (L13)
32934	Cone—Speaker cone and voice coil (L12)
5118	Plug—3 prong male for speaker
32905	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33637	Bezel—Station selector escutcheon
33731	Button—Push button
34270	Dial—Glass dial scale
30863	Knob—Station selector, or volume control and power switch knob
33973	Marker—Station marker
30900	Spring—Retaining spring for push button Stock No. 33731

RCA Victor

MODEL K61

Chassis No. RC-498F

Six Tube, Two Band, AC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.
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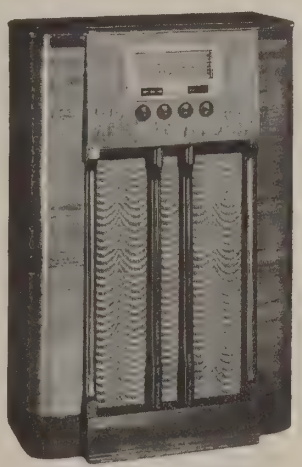
Electrical Specifications

FREQUENCY RANGES

Standard Broadcast	540 to 1,560 kc
Short-Wave	5.8 to 18 mc
Intermediate Frequency	455 kc

TUBE COMPLEMENT

(1) RCA-6SA7.... 1st Detector—Oscillator
(2) RCA-6K7..... I-F Amplifier
(3) RCA-6H6.....2nd Detector—AVC
(4) RCA-6SF5..... Audio Amplifier
(5) RCA-6F6G..... Power Output
(6) RCA-5Y3G..... Rectifier
Pilot Lamp (1)..... .. Mazda No. 51
6.3 volts, 0.20 amp.



POWER OUTPUT RATING

Undistorted	2.5 watts
Maximum	4.5 watts

POWER SUPPLY RATINGS

Rating A.....	105-125 volts, 50-60 cycles, 75 watts
Rating B.....	105-125 volts, 25-60 cycles, 75 watts
Rating C.....	105-125, 200-250 volts, 50-60 cycles, 75 watts

LOUDSPEAKER (RL 70 H 6)

Type..... 12-inch electrodynamic
Voice Coil Impedance at 400 cycles. 2.2 ohms

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	38¼	25⅜	12¾
Chassis Base Dimensions (inches)	2¼	12⅛	5¾
Overall Chassis Height (inches)			7
Weight	45 (Net lbs.)		57 (Shipping lbs.)
Tuning Drive Ratio			10 to 1

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up for any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

2. Set the receiver for "Radio" operation, range selector on "Broadcast", and accurately tune in the station for which the first button is to be set.

3. Press in the first push-button rod (left) with the screwdriver as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Replace the push-button on its shaft.

5. Proceed in a similar manner for the remainder of the push-buttons.

6. Insert the station marker tabs in the recesses above the push-buttons.

First Edition
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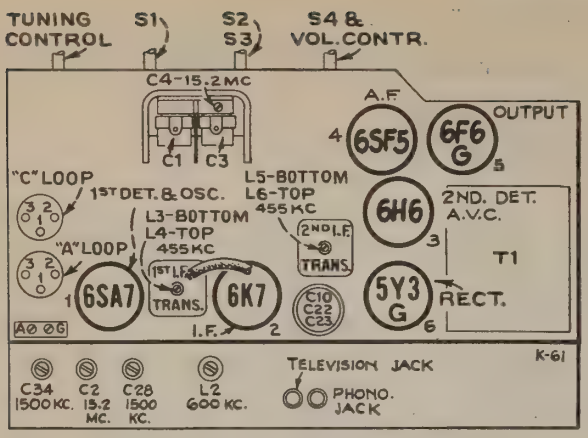
Alignment Procedure



Tube and Trimmer Locations

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the chassis schematic.

Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

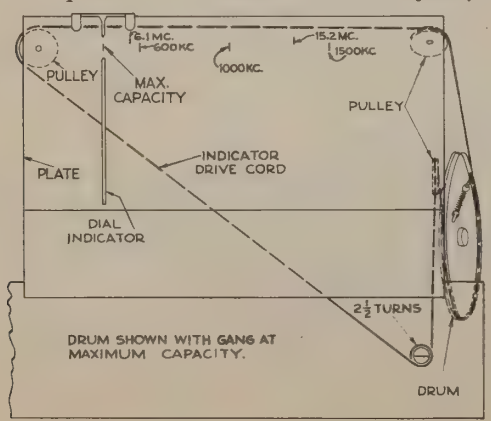
For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect test-osc. output to—	Tune test-osc. to—	Turn radio dial to	Adjust the following for maximum peak output
1	I-F grid through 0.1 mfd capacitor and ground	455 kc	Quiet point between 1,720-1,500 kc	L5 and L6 (2nd I-F trans.)
2	1st det. grid through 0.1 mfd capacitor and ground			L3 and L4 (1st I-F trans.)
3		15.2 mc	15.2 mc	C-4 oscillator*
4	Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver	15.2 mc	Rock at 15.2 mc	C-2 antenna† while rocking
5		6.1 mc	6.1 mc	Spacing between leads from "C" band loop to chassis
6		15.2 mc	Rock at 15.2 mc	C-2 antenna† while rocking
7		1,500 kc	1,500 kc	C-34 antenna C-28 oscillator
8		600 kc	Rock at 600 kc	L-2 oscillator while rocking
9		1,500 kc	1,500 kc	C-34 antenna C-28 oscillator

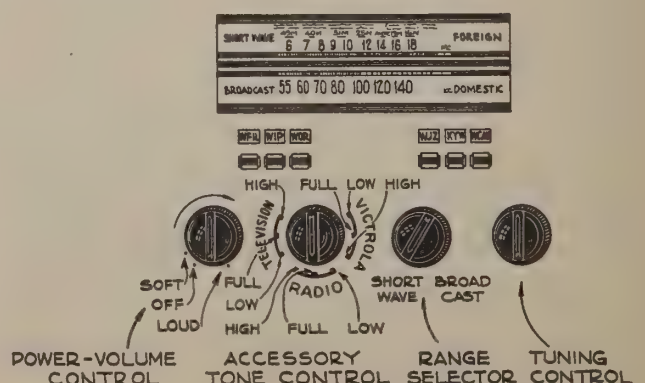
When making adjustments 4 to 9 inclusive the chassis must be in the cabinet, both loops connected, and all leads in their normal positions. When mounting chassis in cabinet if calibration marks on dial plate do not line up with dial scale mounted on cabinet move pointer to agree with dial scale on cabinet.

* Oscillator should track on high frequency side of signal. If two peaks are obtained use high frequency (minimum capacity) peak.

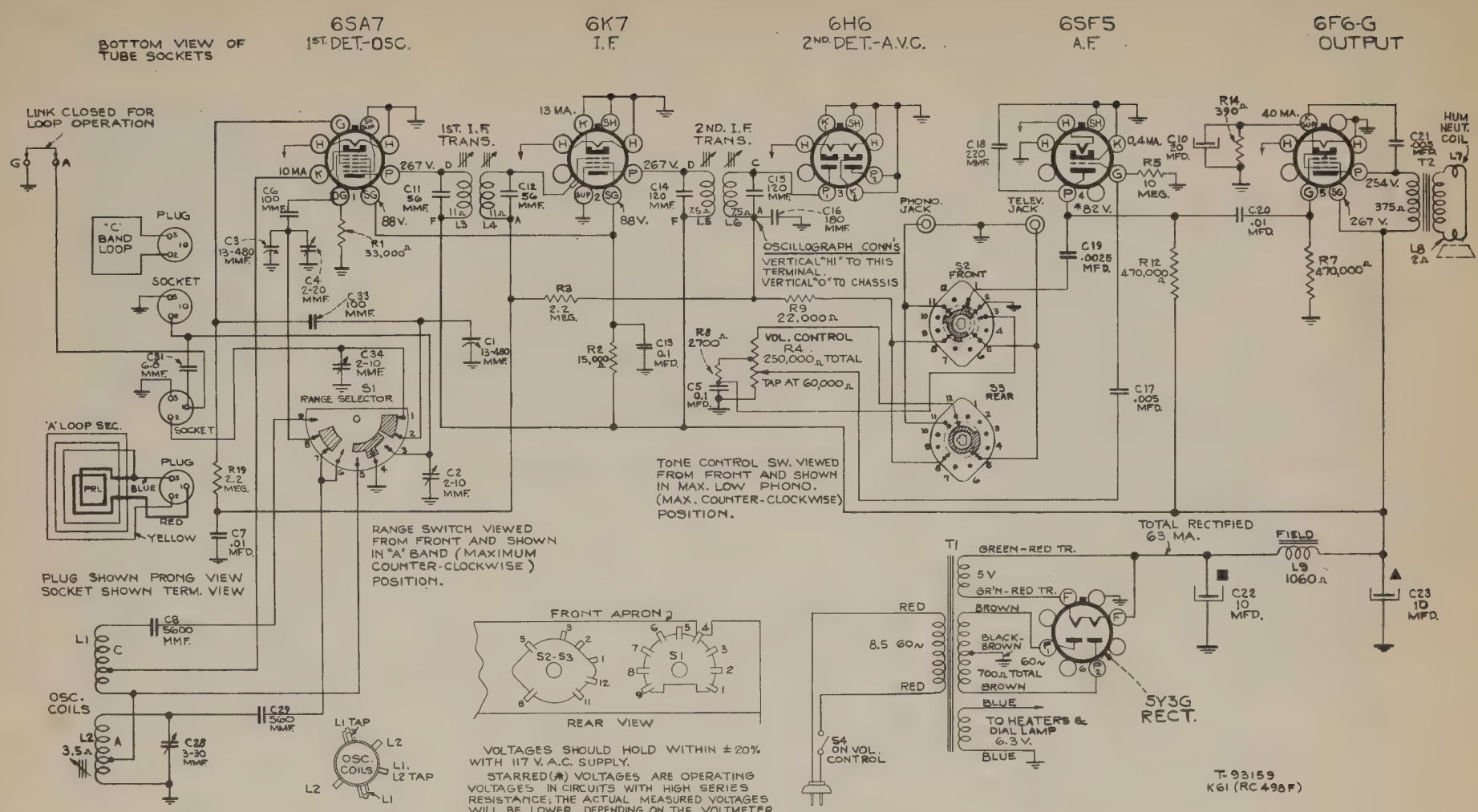
† If two peaks can be obtained use low frequency (maximum capacity) peak.



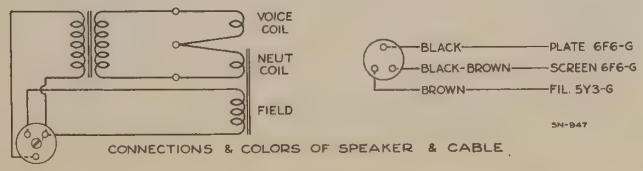
Dial Indicator and Drive Mechanism



Dial and Controls


BOTTOM VIEW OF TUBE SOCKETS
6SA7 1ST. DET.-OSC.
6K7 I.F.
6H6 2ND. DET.-A.V.C.
6SF5 A.F.
6F6-G OUTPUT
LINK CLOSED FOR LOOP OPERATION
1ST. I.F. TRANS.
2ND. I.F. TRANS.
OSCILLOGRAPH CONN'S VERTICAL "HI" TO THIS TERMINAL, VERTICAL "O" TO CHASSIS
PHONO. JACK
TELEV. JACK
VOL. CONTROL R4 250,000Ω TOTAL
TAP AT 60,000Ω
RANGE SELECTOR
"A" LOOP SEC.
"C" BAND LOOP
PLUG
SOCKET
TONE CONTROL SW. VIEWED FROM FRONT AND SHOWN IN MAX. LOW PHONO. (MAX. COUNTER-CLOCKWISE) POSITION.
RANGE SWITCH VIEWED FROM FRONT AND SHOWN IN "A" BAND (MAXIMUM COUNTER-CLOCKWISE) POSITION.
PLUG SHOWN PRONG VIEW SOCKET SHOWN TERM. VIEW
OSC. COILS
FRONT APRON
REAR VIEW
TOTAL RECTIFIED 63 MA.
FIELD
GREEN-RED TR.
TO HEATERS & DIAL LAMP 6.3 V.
5Y3G RECT.
S4 ON VOL. CONTROL
VOLTAGES SHOULD HOLD WITHIN ± 20% WITH 117 V. A.C. SUPPLY.
STARRED (*) VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE; THE ACTUAL MEASURED VOLTAGES WILL BE LOWER DEPENDING ON THE VOLTMETER LOADING.
T-93159
K61 (RC 498F)

Schematic Circuit Diagram



CONNECTIONS & COLORS OF SPEAKER & CABLE

Precautionary Lead Dress.—

1. Dress AC switch leads away from 6SF5 tube socket.
2. Do not twist loop leads together or around each other. Spacing between leads from "C" band loop to chassis is important—see alignment step "5".
3. "High side" leads from loop sockets, range switch, oscillator coil, and trimmers must be dressed away from chassis and each other.
4. Dress C-6 and C-33 away from each other.
5. Dress C-17 away from power switch leads.

Antennas

This receiver is equipped with two loop antennas ("C" band horizontal and fixed, and "A" band vertical and rotatable). During operation the "A" band loop should be rotated to the position giving maximum signal strength and freedom from noise. If desired, an outside antenna and ground can be connected to the terminals provided and when this is done the link between these terminals must be opened. However, for loop operation this link must be closed.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-498F)
34724	Board—"Antenna-Ground" board
34725	Capacitor—Trimmer comprising 1 section of 3-30 mmfd. (C28) and 2 sections of 2-10 mmfd. (C2, C34)
14079	Capacitor—6.8 mmfd. (C31)
30949	Capacitor—56 mmfd. (C11, C12, C14, C15)
12720	Capacitor—100 mmfd. (C6, C33)
34700	Capacitor—120 mmfd. (C14, C15)
13003	Capacitor—180 mmfd. (C16)
12694	Capacitor—220 mmfd. (C18)
12537	Capacitor—560 mmfd. (C29)
13895	Capacitor—5600 mmfd. (C8)
34459	Capacitor—.0025 mfd. (C19)
33584	Capacitor—.005 mfd. (C17, C21)
4937	Capacitor—.01 mfd. (C7, C20)
4839	Capacitor—0.1 mfd. (C13, C5)
32240	Capacitor—Electrolytic comprising 2 sections of 10 mfd. and 1 section of 20 mfd. (C10, C22, C23)
32707	Coil—Oscillator coil (L1, L2)
33215	Control—Volume control and power switch
32634	Cord—Tuning condenser drive cord
32713	Core—Adjustable core and stud for oscillator coil
33633	Indicator—Station selector indicator
11765	Lamp—Dial lamp
35562	Plate—Dial plate complete less dial scale and tuner
5119	Plug—3 contact female plug for speaker cable
31388	Resistor—390 ohms, 1 watt (R14)
30546	Resistor—470 ohms, ½ watt (R14)
14024	Resistor—2,700 ohms, ½ watt (R8)
12312	Resistor—3,300 ohms, ½ watt (R10)
14075	Resistor—8,200 ohms, ½ watt (R16)
13998	Resistor—22,000 ohms, ½ watt (R9)
12454	Resistor—33,000 ohms, ½ watt (R1)
12266	Resistor—39,000 ohms, ½ watt (R18)
12285	Resistor—470,000 ohms, ½ watt (R7, R12)
12679	Resistor—2.2 megohm, ½ watt (R3, R19)
13601	Resistor—10 megohm, ½ watt (R5)
33735	Screw—Push arm adjusting screw
34411	Shaft—Tuning condenser drive shaft
31364	Socket—Dial lamp socket
33514	Socket—Phonograph input socket
31319	Socket—Tube socket
34726	Spring—Push arm return spring .018 dia. wire.
34720	Switch—Radio, Phono, Television, Tone switch (S2, S3)
34722	Switch—Range switch (S1)
32263	Transformer—First i-f transformer (L3, L4, C11, C12)
34524	Transformer—Second i-f transformer
33818	Transformer—Power transformer, 110 volts, 25 cycle
33112	Transformer—Power transformer, 110 volts, 60 cycle
31575	Transformer—Power transformer, 110-220 volts, 60 cycle
33726	Washer—Retaining washer for shaft Stock No. 34411
	SPEAKER ASSEMBLIES (RL-70H6)
31825	Cap—Cone center dust cap
11469	Coil—Hum neutralizing coil (L13)
33116	Coil—Speaker field coil (L15)
31275	Cone—Speaker cone, voice coil and dust cap (L14)
5118	Plug—3-contact male for speaker
31301	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
35563	Button—Push button
31456	Cover—Protective cover for push button markers
35386	Decalcomania—"Gramo" decal
35387	Decalcomania—"Power-Volume" decal
35389	Decalcomania—"Range" decal
35392	Decalcomania—"RCA Victor" decal
35390	Decalcomania—"Shortwave-Broadcast" decal
35388	Decalcomania—"Tone" decal
35391	Decalcomania—"Tuning" decal
35385	Decalcomania—"Victrola-Radio-Television" decal
35565	Dial—Glass dial scale
35564	Escutcheon—Dial scale and push button escutcheon less scale and buttons
34583	Frame—Frame only for "C" band loop
34998	Knob—Tuning, volume, tone, and range switch knob
34800	Loop—Antenna loop complete for "A" band
33973	Marker—Station selector markers
34872	Pins—Dowel pins for "A" band loop
34990	Plug—2-prong male plug for "C" band loop
32641	Plug—3-prong male plug for "A" band loop
14270	Spring—Retaining spring for button Stock No. 35563 and knob Stock No. 34998

RCA Victor

MODEL T63

(Chassis No. RC-472F)

Six-Tube, Two-Band, A-C, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast	550-1,550 kc
Short Wave	5.8-18 mc
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SA7	1st Detector-Oscillator
(2) RCA-6K7	I-F Amplifier
(3) RCA-6SQ7	2nd Detector, AVC, and A-F Amplifier
(4) RCA-6F6G	Power Output
(5) RCA-6U5/6G5	Tuning Indicator
(6) RCA-5Y3G	Rectifier
PILOT LAMP (1)	Mazda No. 51, 6.3 volts, 0.20 amps.

POWER OUTPUT RATING

Undistorted	2.5 watts
Maximum	4.5 watts

LOUDSPEAKER (RL 79 A 4)

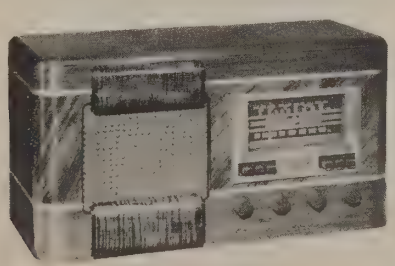
Type	6 inch Electrodynamic
Voice Coil Impedance at 400 Cycles	3.4 ohms

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 75 watts
Rating B	105-125 volts, 25-60 cycles, 75 watts
Rating C	105-125, 200-250 volts, 50-60 cycles, 75 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	10⅜	19	8½
Chassis Base Dimensions (inches)	2¼	12¼	5¾
Overall Chassis Height			8¼ inches
Weight			21 (Shipping lbs.)
Tuning Drive Ratio			10 to 1



ANTENNAS

This receiver is equipped with a loop antenna for "A" and "C" bands. Both loops are fixed in position being mounted vertically from the rear of the chassis. For best performance the receiver should be turned to a position giving maximum signal strength and freedom from noise. The loop connections are shown in a separate diagram. If desired, an external antenna and ground can be connected to the terminals provided. In this case the link between these terminals must be opened; however, for loop operation this link must be closed.

First Edition

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Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action. The low side of the test-oscillator should be connected to the receiver chassis.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, adjust the dial indicator along the drive cable to the 540 kc mark, gang condenser fully meshed. The indicator has a clip for attachment to the cable.

Precautionary Lead Dress:

(1) Dress C8 (Oscillator coil to range switch) and its leads away from surrounding wires and chassis.

(2) Dress R2 (Screen to B+) away from surrounding wires and parts.

(3) Dress power switch leads away from 6SQ7 and 6F6G tube sockets.

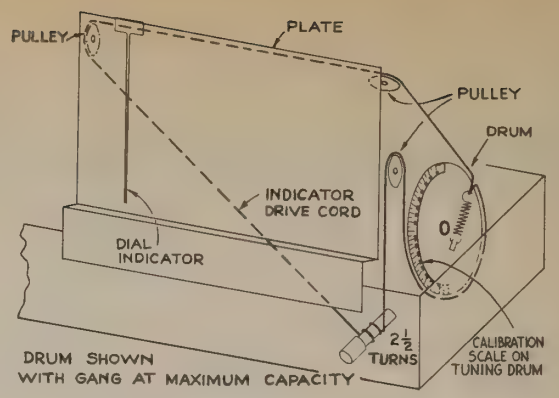
For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect high side of test-osc. to—	Tune test osc. to—	Turn radio Dial to	Adjust the following for max. peak output
1	Grid of 6K7 through 0.01 mfd.	455 kc	"A" band Quiet point between 550-750 kc	L5 and L6 (2nd I-F trans.)
2	Grid of 6SA7 through 0.01 mfd.			L3 and L4 (1st I-F trans.)
3	Antenna terminal through 300 ohms	15 mc	"C" band 15 mc (132°)	C4 osc.* C27 ant.**
4	Antenna terminal through 200 mmfd.	600 kc	"A" band 600 kc (23.5°)	L2 osc. (Rock in)
5		1,500 kc	"A" band 1,500 kc (156.5°)	C9 osc. C26 ant.
6	Repeat Steps 4 and 5			

* Use **minimum** capacity peak if two can be obtained.

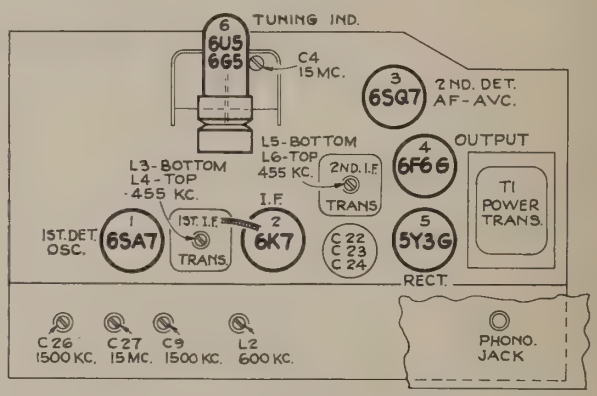
** Use **maximum** capacity peak if two can be obtained.

NOTE: Oscillator tracks **above** signal on all bands.



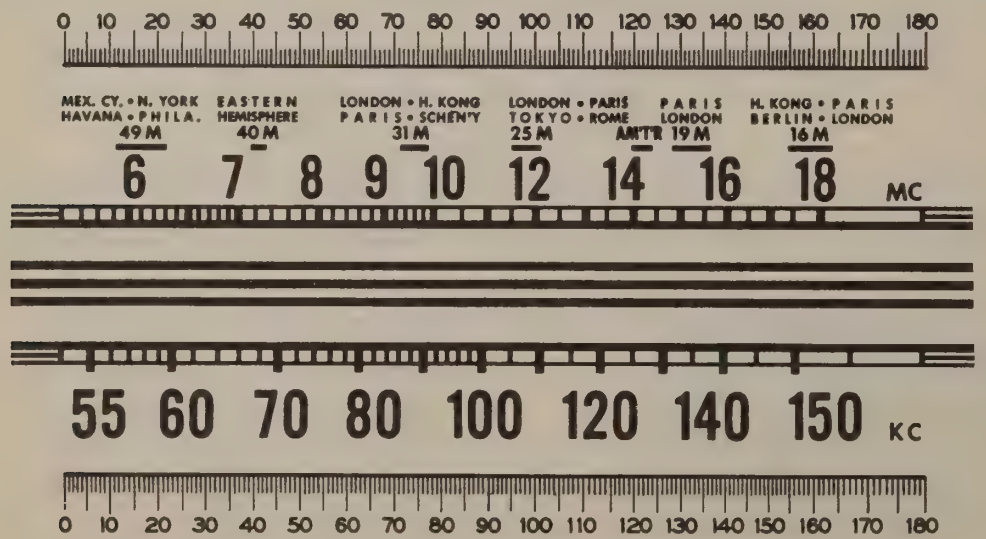
Dial Indicator and Drive Mechanism

Dial and Controls



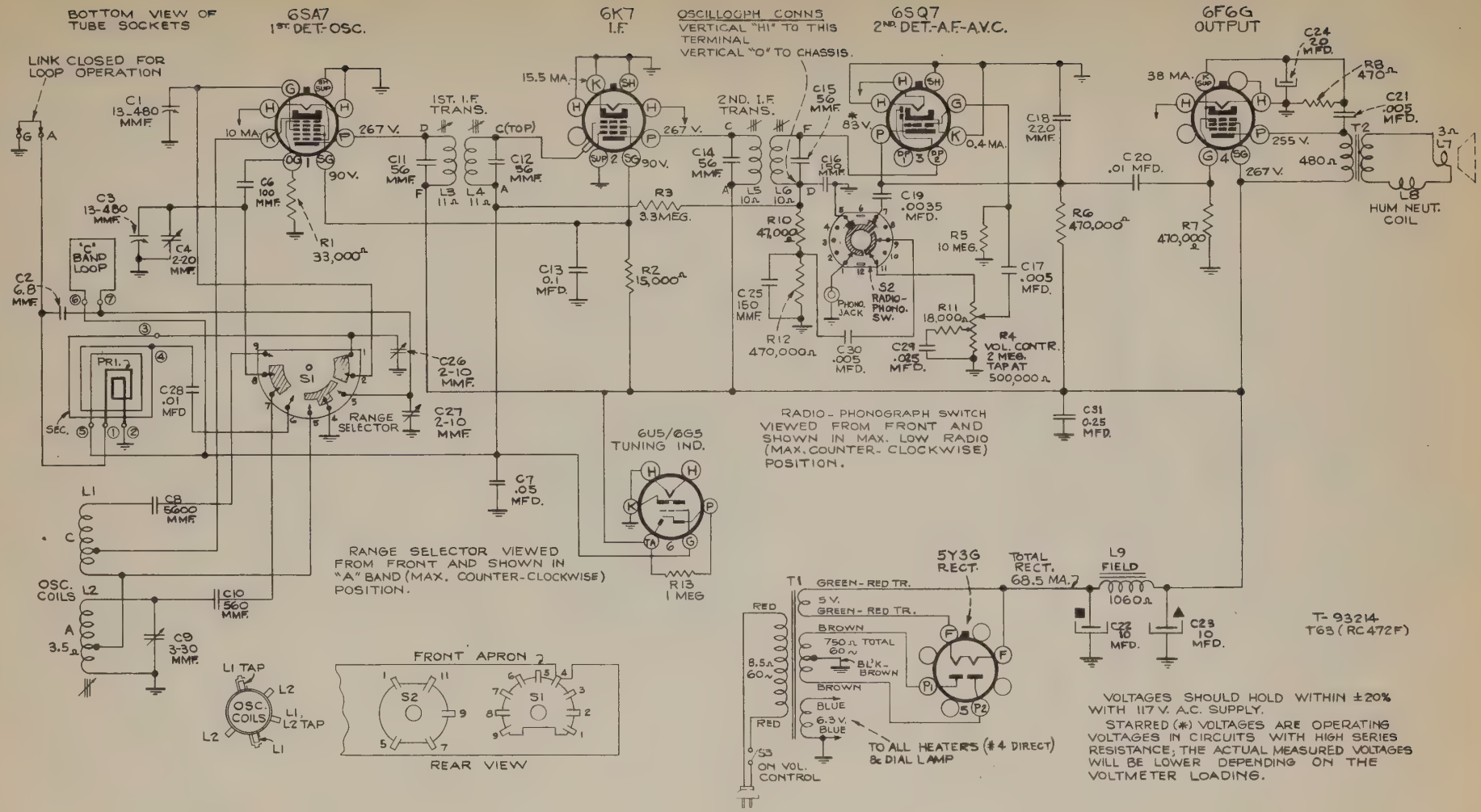
Tube and Trimmer Locations

Calibration Scale

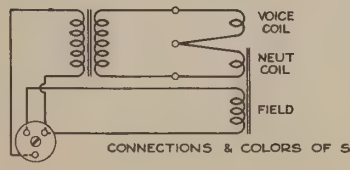


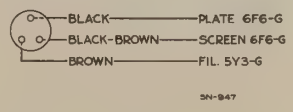
Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

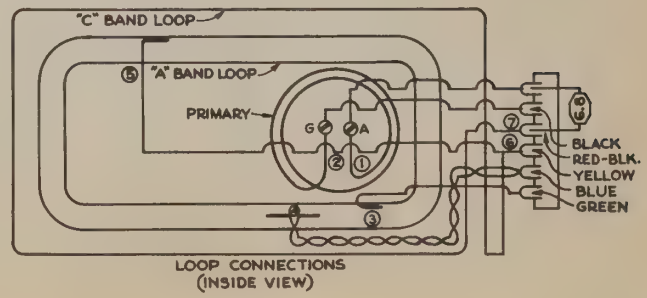
The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 23° on the calibration scale corresponds to approximately 600 kc. on "A" band, and 6.35 mc. on "C" band, etc. Read instructions under "Alignment Procedure".



Schematic Circuit Diagram







Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up for any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

2. Set the receiver for "Radio" operation, range selector on "Broadcast", and accurately tune in the station for which the first button is to be set.

3. Press in the first push-button rod (left) with the screwdriver as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Replace the push-button on its shaft.

5. Proceed in a similar manner for the remainder of the push-buttons.

6. Insert the station marker tabs in the recesses above the push-buttons.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC 472-F)
35586	Back—Back complete with loops
33719	Belt—Tuning unit push arm belt
30766	Cap—Rubber cap for tuning tube
34725	Capacitor—Mica trimmer consisting of 1 section of 3-30 mmfd. (C9) and 2 sections of 2-10 mmfd. (C26 and C27)
14079	Capacitor—6.8 mmfd. (C2)
30949	Capacitor—56 mmfd. (C11, C12, C14, C15)
12720	Capacitor—100 mmfd. (C6)
12725	Capacitor—150 mmfd. (C16, C25)
12694	Capacitor—220 mmfd. (C18)
12537	Capacitor—560 mmfd. (C10)
13895	Capacitor—5,600 mmfd. (C8)
30303	Capacitor—.0035 mfd. (C19)
33584	Capacitor—.005 mfd. (C17, C21, C30)
4937	Capacitor—.01 mfd. (C20, C28)
4839	Capacitor—0.1 mfd. (C13)
12484	Capacitor—0.25 mfd. (C31)
4870	Capacitor—.025 mfd. (C29)
32787	Capacitor—.05 mfd. (C7)
32240	Capacitor—Electrolytic—comprising 2 sections of 10 mfd. (C22 and C23) and 1 section of 20 mfd (C24)
34285	Clip—Clip and screw for tuning tube
35443	Coil—Loop loading coil
32707	Coil—Oscillator coil
35585	Control—Volume control and power switch
32713	Core—Adjusting core and stud for oscillator coil
32634	Cord—Drive cord
33633	Indicator—Station selector indicator
11765	Lamp—Dial lamp
35586	Loop—Loops ("A" and "C" bands) complete with back
35594	Plate—Dial plate complete less tuner and dial
5119	Plug—3 contact female plug for speaker cable
30681	Resistor—470 ohms, 1 watt (R8)
35595	Resistor—15,000 ohms, 3 watt (R2)
13045	Resistor—18,000 ohms, ½ watt (R11)
12454	Resistor—33,000 ohms, ½ watt (R1)
12412	Resistor—47,000 ohms, ½ watt (R10)
12285	Resistor—470,000 ohms, ½ watt (R6, R7, R12)
12013	Resistor—1 megohm, 1/10 watt (R13)
12928	Resistor—3.3 megohm, ½ watt (R3)
13601	Resistor—10 megohm, ½ watt (R5)
33735	Screw—Push button lock screw
33725	Shaft—Tuning condenser drive shaft
31364	Socket—Dial lamp socket
31319	Socket—Tube socket
34799	Socket—Tuning tube socket
31418	Spring—Drive cord spring
33720	Spring—Push arm return spring
35584	Switch—Radio—Record switch
35177	Switch—Range switch
32263	Transformer—First I.F. transformer
34719	Transformer—Second I.F. transformer
35587	Transformer—Power transformer, 110 volt, 60 cycle
35588	Transformer—Power transformer, 110 volt, 25 cycle
33635	Tuner—6 button tuning condenser
33726	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLIES (RL 79A4)
32907	Cap—Dust cap
32906	Coil—Neutralizing coil (L11)
33601	Coil—Field coil (L13)
35441	Cone—Cone complete with voice coil and center suspension
5118	Plug—3 contact male connector plug for reproducer
32905	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
35563	Button—Push button
35592	Decalcomania—Control decal
35392	Decalcomania—"RCA Victor" decal
35462	Decalcomania—"Television — Radio — Victrola" decal
35589	Dial—Glass dial scale
35591	Escutcheon—Dial scale and push button escutcheon less scale and button
35590	Knob—Tuning, range, volume control, or radio record switch knob
30900	Spring—Retaining spring for button, Stock No. 35563, and knob, Stock No. 35590

RCA Victor

MODEL T-64

Chassis No. RC-416

Six-Tube, Three-Band, AC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 25 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast	540-1,720 kc
Medium Wave	2.3-7.0 mc
Short Wave	7.0-22.0 mc
INTERMEDIATE FREQUENCY	455 kc

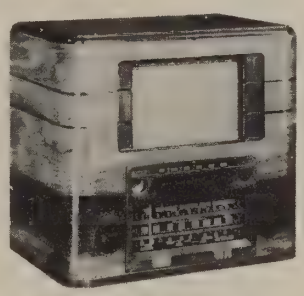
TUBE COMPLEMENT

(1) RCA-6SA7... 1st Detector—Oscillator
(2) RCA-6SK7..... I-F Amplifier
(3) RCA-6SQ7..... 2nd Detector, A.V.C., and A-F Amplifier
(4) RCA-6F6-G..... Power Output
(5) RCA-6U5/6G5..... Tuning Indicator
(6) RCA-5Y3-G..... Rectifier

PILOT LAMPS (2).. Mazda No. 44, 6.3 volts, 0.25 amp.

POWER OUTPUT RATING

Undistorted	2.5 watts
Maximum	4.5 watts



LOUDSPEAKER (RL-79-4)

Type	6-inch Electrodynamic
V.C. Impedance	3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 75 watts
Rating B	105-125 volts, 25-60 cycles, 75 watts
Rating C	100-130, 140-160, 195-250 volts, 40-60 cycles, 75 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	13 5/16	14 3/8	9 1/8
Chassis Base Dimensions (inches)	2 3/4	12 1/4	7
Over-all Chassis Height			7 inches
Weight			23 lbs. (Shipping), 20 lbs. (Net)
Tuning Drive Ratio			10 to 1

Push Button Adjustment

The push-buttons should be adjusted for six favorite stations after the receiver is operating, and has had a brief warm-up period.

Any standard broadcast stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-button screws in back of the station-marker recesses.
2. Set Accessory-Tone Knob to "Radio" and turn the range selector to "A," so that the "A" band indicator lights up.
3. Press in the tuning knob and accurately tune in the first station.
4. With station accurately tuned in, press in the first push-button and tighten the screw.
5. Place the station marker tab in the recess.
6. Proceed in a similar manner to adjust the remainder of the push-buttons.

First Edition

Trademarks "Magic Eye," "Victrola," Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord-Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 240° mark on the drum scale must be vertical and directly above the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

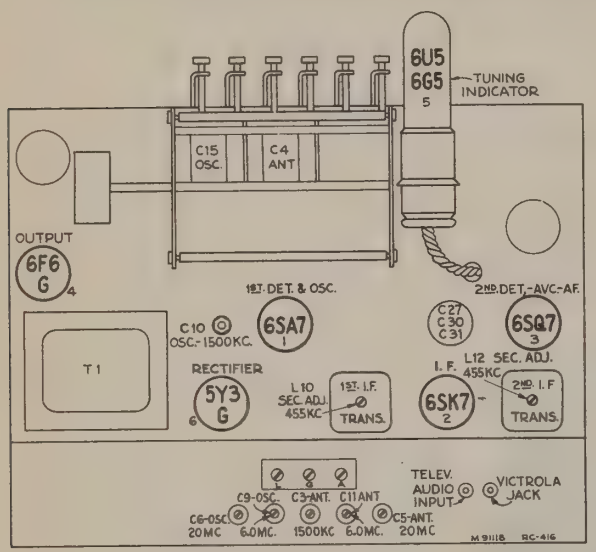
Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 240° mark on the calibration scale when the plates are fully meshed.

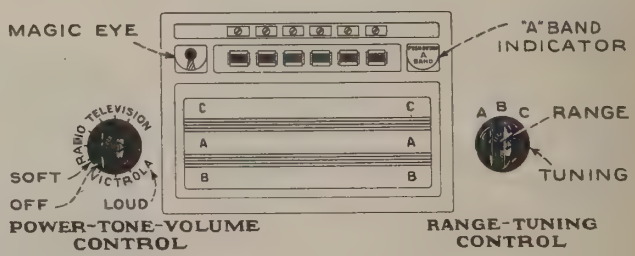
Steps	Connect the high side of the test-osc. to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 grid in series with .01 mfd.	455 kc	"A" Band Quiet Point between 550-750 kc	L11 and L12 (2nd I-F Trans.)
2	6SA7 grid in series with .01 mfd.			L9 and L10 (1st I-F Trans.)
3	Ant. terminal in series with 300 ohms	20 mc	20 mc (40°) "C" Band	C6 (osc.)* C5 (ant.)
4		6 mc	6 mc (52.5°) "B" Band	C9 (osc.)** C11 (ant.)
5	Ant. terminal in series with 200 mmfd.	1,500 kc	1,500 kc (41.75°) "A" Band	C10 (osc.) C3 (ant.)
6		600 kc	600 kc (200.25°) "A" Band	L7 (osc.) Rock Gang
7	Repeat step 5.			

* Use minimum capacity peak if two can be obtained. Check to determine that C6 has been adjusted to correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

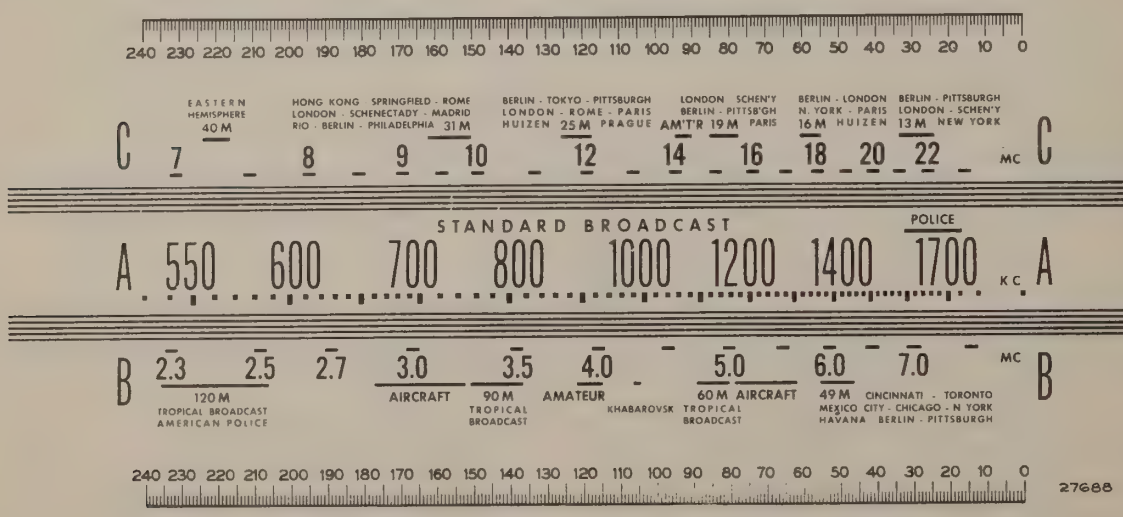
** Use minimum capacity peak if two can be obtained. Check to determine that C9 has been adjusted to correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

Note: Oscillator tracks above signal on all bands.



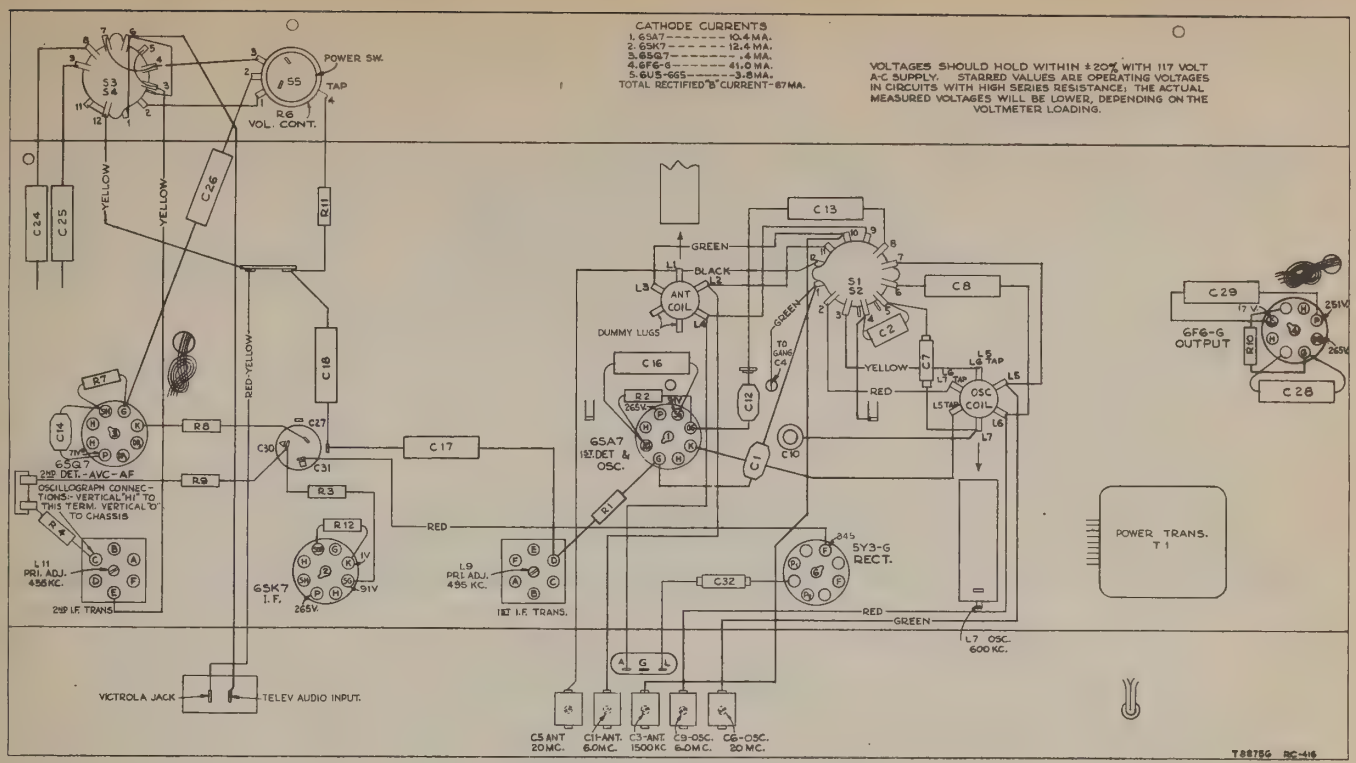


Calibration Scale


240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
EASTERN HEMISPHERE 40 M
HONG KONG SPRINGFIELD - ROME LONDON - SCHENECTADY - MADRID RIO - BERLIN - PHILADELPHIA 31 M
BERLIN - TOKYO - PITTSBURGH LONDON - ROME - PARIS HUIZEN 25 M PRAGUE
LONDON SCHEN'Y BERLIN - PITTSB'GH AM'T'R 19 M PARIS
BERLIN - LONDON N. YORK - PARIS 16 M HUIZEN
BERLIN - PITTSBURGH LONDON - SCHEN'Y 13 M NEW YORK
C 7 8 9 10 12 14 16 18 20 22 MC C
STANDARD BROADCAST
POLICE
A 550 600 700 800 1000 1200 1400 1700 KC A
B 2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 7.0 MC B
120 M TROPICAL BROADCAST AMERICAN POLICE
AIRCRAFT
90 M TROPICAL BROADCAST
AMATEUR
KHABAROVSK TROPICAL BROADCAST
60 M AIRCRAFT
49 M MEXICO CITY - CHICAGO - N YORK HAVANA BERLIN - PITTSBURGH
CINCINNATI - TORONTO
240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
27688

Receiver Dial Scales, and Corresponding 0-240° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 200.25° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."



BOTTOM VIEW-REAR OF CHASSIS

R-F. WIRING & SOCKET VOLTAGES

Note: On some receivers the following circuit changes are in effect:

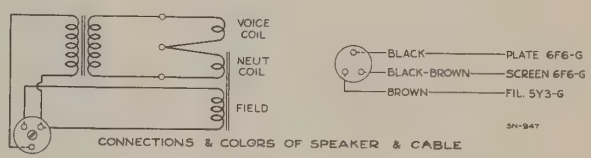
1. C1 is 470 mmfd.
2. There are three types of 2nd. I-F transformers in use.

a. The first type (Stock No. 14308) has C23 and R5 mounted inside the case, and is connected exactly as shown below.

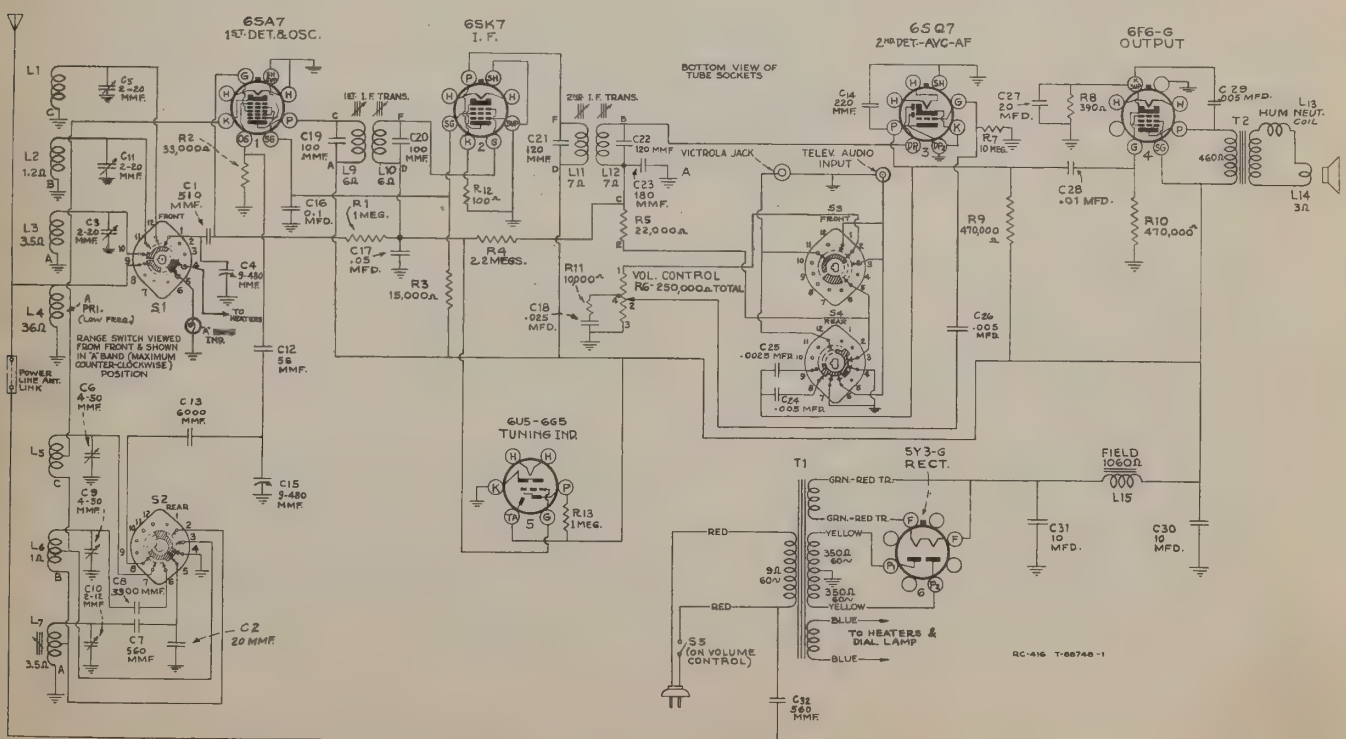
b. In the second type R5 is omitted and the lead from S4 connects to C instead of E. E is not used.

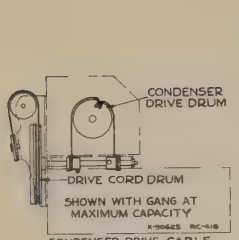
c. In the third type R5 is omitted and C23 is connected externally from C to ground. E is not used. The lead from the diode plate connects to A instead of B. When replacing this transformer with Stock No. 14308, remove the external C23 and connect the replacement transformer as shown in the schematic diagram.

Important: Stock No. 14308 is used as replacement for all three of the above types, and should be connected as shown in the schematic diagram.

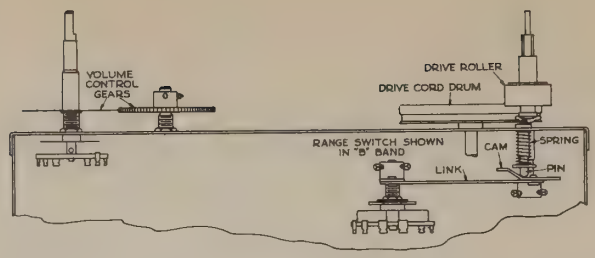


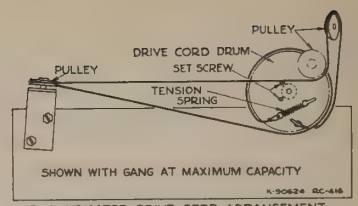
CONNECTIONS & COLORS OF SPEAKER & CABLE





CONDENSER DRIVE CABLE ARRANGEMENT





DIAL INDICATOR DRIVE CORD ARRANGEMENT

Note: Adjustment of the link and cam should be such that in "A" band position when push-buttons are operated, the drive cord drum will turn freely without rubbing or binding against the drive roller.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-416)
33620	Arm—Push arm and cam assembly on tuning unit—less lock screw
33430	Board—Antenna and ground terminal board
34268	Cap—Rubber cap for tuning tube
12714	Capacitor—Air trimmer, 2-12 mmfd. (C10)
33429	Capacitor—Trimmer capacitor bank, two 4-50 mmfd., three 2-20 mmfd., sections (C3, C5, C6, C9, C11)
32792	Capacitor—25 mmfd. (C2)
12723	Capacitor—56 mmfd. (C12)
30904	Capacitor—100 mmfd. (C19, C20)
12404	Capacitor—120 mmfd. (C21, C22)
14712	Capacitor—180 mmfd. (C23)
12694	Capacitor—220 mmfd. (C14)
30433	Capacitor—470 mmfd. (C1)
12537	Capacitor—560 mmfd. (C32)
31433	Capacitor—560 mmfd. (C7)
31403	Capacitor—3,300 mmfd. (C8)
31405	Capacitor—6,000 mmfd. (C13)
5107	Capacitor—.0025 mfd. (C25)
4838	Capacitor—.005 mfd. (C24, C26, C29)
4937	Capacitor—.01 mfd. (C28)
4870	Capacitor—.025 mfd. (C18)
32787	Capacitor—.05 mfd. (C17)
4839	Capacitor—0.1 mfd. (C16)
32240	Capacitor—Electrolytic, two 10 mfd., and one 20 mfd. sections (C27, C30, C31)
33508	Clip—Magic Eye mounting clip and bracket
32821	Coil—Antenna coil (L1, L2, L3, L4)
32824	Coil—Oscillator coil (L5, L6, L7)
32635	Cord—Condenser drive cord
32634	Cord—Drive cord
32713	Core—Adjustable core and stud for oscillator coil
33627	Drum—Condenser drive drum
34267	Drum—Drive cord drum
33186	Gear—Volume control knob shaft and gear
33185	Gear—Volume control gear and hub, with set screws
11891	Lamp—Dial lamp
33431	Link—Antenna and ground terminal board link
34041	Link—Link complete with arm and cam for operating range switch
33628	Plate—Front guide plate for push arms
13871	Plug—Eye cable plug
5119	Plug—Speaker cable plug
33509	Pulley—Drive cord pulley and bracket (1 pulley)
33510	Pulley—Drive cord pulleys and bracket (2 pulleys)
33626	Pulley—Drive pulley
14439	Resistor—100 ohms, ½ watt (R12)
31388	Resistor—390 ohms, 1 watt (R8)
14559	Resistor—10,000 ohms, ½ watt (R11)
33489	Resistor—15,000 ohms, 2.5 watts (R3)
14284	Resistor—22,000 ohms, 1/10 watt (R5)
12454	Resistor—33,000 ohms, ½ watt (R2)
12285	Resistor—470,000 ohms, ½ watt (R9, R10)
12013	Resistor—1 meg., 1/10 watt (R13)
13730	Resistor—1 meg., ½ watt (R1)
12679	Resistor—2.2 meg., ½ watt (R4)
14343	Retainer—Retaining ring for volume control knob shaft
34040	Ring—Retaining ring for tuning shaft
4669	Screw—No. 8-32 sq. hd. set screw for volume control gear and drum
33621	Screw—Push arm lock screw
34039	Shaft—Range switch knob shaft
33624	Shaft—Tuning condenser drive shaft and washer
34038	Shaft—Tuning knob shaft with rubber drive roller and pulley assembled
33545	Shield—Dial lamp shield
31364	Socket—Dial lamp socket
33514	Socket—Phonograph and Television socket
31319	Socket—Tube socket
33544	Spring—Drive cord tension spring
33623	Spring—Drive drum cord spring
33622	Spring—Push arm return spring
34042	Spring—Spring and pin for range switch shaft
33515	Spring—Tension spring for spring and pin
33513	Switch—Range switch (S1, S2)
33511	Tone Control, Television and Phono switch (S3, S4)
33428	Transformer—First i-f transformer (L9, L10, C19, C20)
14308	Transformer—Second i-f transformer (L11, L12, C21, C22, C23, R5)
33619	Transformer—Power transformer 105-120 volts, 25-60 cycles (T1)
33112	Transformer—Power transformer 105-120 volts, 50-60 cycles (T1)
31446	Transformer—Power transformer—Universal 60 cycle (T1)
33512	Volume control and power switch (R6, S5)
33726	Washer—"C" washer for spring and pin
34037	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLIES (RL-79-4)
32907	Cap—Cone center dust cap
32906	Coil—Hum neutralizing coil (L13)
33547	Coil—Speaker field coil (L15)
5118	Plug—3-contact male plug for speaker
32905	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33474	Button—Push button
33552	Dial—Glass dial scale
33549	Escutcheon—Dial and push button escutcheon—less buttons and screen
33551	Frame—Dial frame, holder, and pointer assembled—less dial
33842	Marker—Station selector call letter markers
33550	Screen—"Push button 'A' Band" marker screen
30330	Spring—Retaining spring for knob Stk. No. 33470
14270	Spring—Retaining spring for knob Stk. No. 33553 and Stock No. 33471
4982	Spring—Retaining spring for knob Stk. No. 33505

RCA Victor

MODEL K-80

Chassis No. RC-415-A

Eight-Tube, Three-Band, AC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 30 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast	540-1,720 kc
Medium Wave	2.3-7.0 mc
Short Wave	7.0-22.0 mc
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SA7..... 1st Detector-Oscillator
(2) RCA-6SK7..... I-F Amplifier
(3) RCA-6SQ7..... 2nd Detector, A.V.C., and A-F Amplifier
(4) RCA-6SF5..... Inverter
(5) RCA-6F6-G..... Power Output
(6) RCA-6F6-G..... Power Output
(7) RCA-5Y3-G..... Rectifier
(8) RCA-6U5/6G5..... Tuning Indicator

PILOT LAMPS (2)
Mazda No. 44, 6.3 volts, 0.25 amp.

POWER OUTPUT RATING

Undistorted	5.0 watts
Maximum	5.5 watts

LOUDSPEAKER (RL-70J-1)

Type	12-inch electrodynamic
V.C. Impedance	2.2 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 85 watts
Rating B	105-125 volts, 25-60 cycles, 85 watts
Rating C	100-130, 140-160, 195-250 volts, 40-60 cycles, 85 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	42 3/8	28	14 11/16
Chassis Base Dimensions (inches)	3 1/4	16 3/8	8 1/2

Over-all Chassis Height	7 1/4 inches
Weight	77 lbs. (Shipping), 61 lbs. (Net)
Tuning Drive Ratio	18 to 1

Push Button Adjustment

The push-buttons should be adjusted for eight favorite stations after the receiver is operating, and has had a brief warm-up period.

Any standard broadcast stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-button screws in back of the station-marker recesses.
2. Set Accessory-Tone Knob to "Radio" and turn the range selector to "A."
3. Press in the tuning knob and accurately tune in the first station.
4. With station accurately tuned in, press in the first push-button and tighten the screw.
5. Place the station marker tab in the recess.
6. Proceed in a similar manner to adjust the remainder of the push-buttons.

First Edition

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical and directly under the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

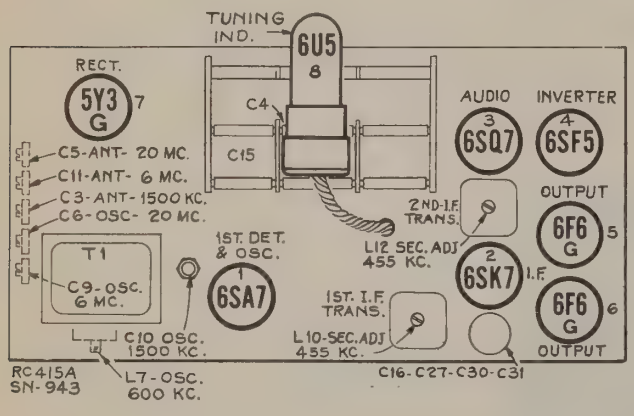
Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

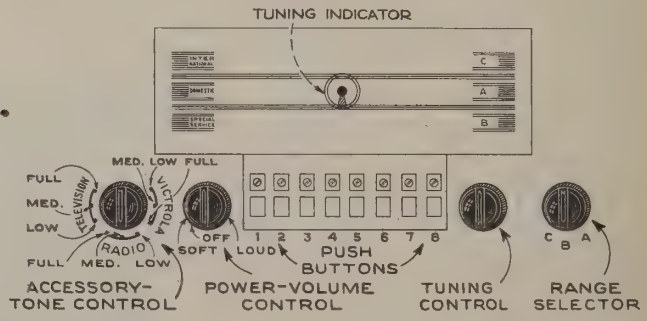
Steps	Connect the high side of the test-osc. to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 grid in series with .01 mfd.	455 kc	"A" Band Quiet Point between 550-750 kc	L11 and L12 (2nd I-F Trans.)
2	6SA7 grid in series with .01 mfd.			L9 and L10 (1st I-F Trans.)
3	Ant. terminal in series with 300 ohms	20 mc	20 mc (200°) "C" Band	C6 (osc.)* C5 (ant.)
4		6 mc	6 mc (187.5°) "B" Band	C9 (osc.)** C11 (ant.)
5	Ant. terminal in series with 200 mmfd.	1,500 kc	1,500 kc (198.25°) "A" Band	C10 (osc.) C3 (ant.)
6		600 kc	600 kc (39.75°) "A" Band	L7 (osc.) Rock Gang
7	Repeat step 5.			

* Use **minimum** capacity peak if two can be obtained. Check to determine that C6 has been adjusted to correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

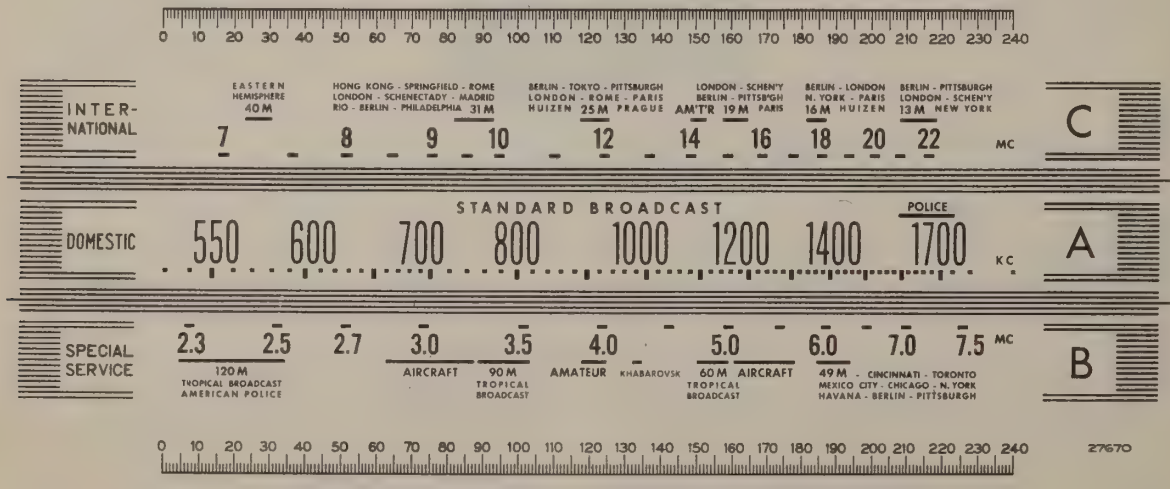
** Use **minimum** capacity peak if two can be obtained. Check to determine that C9 has been adjusted to correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

Note: Oscillator tracks above signal on all bands.



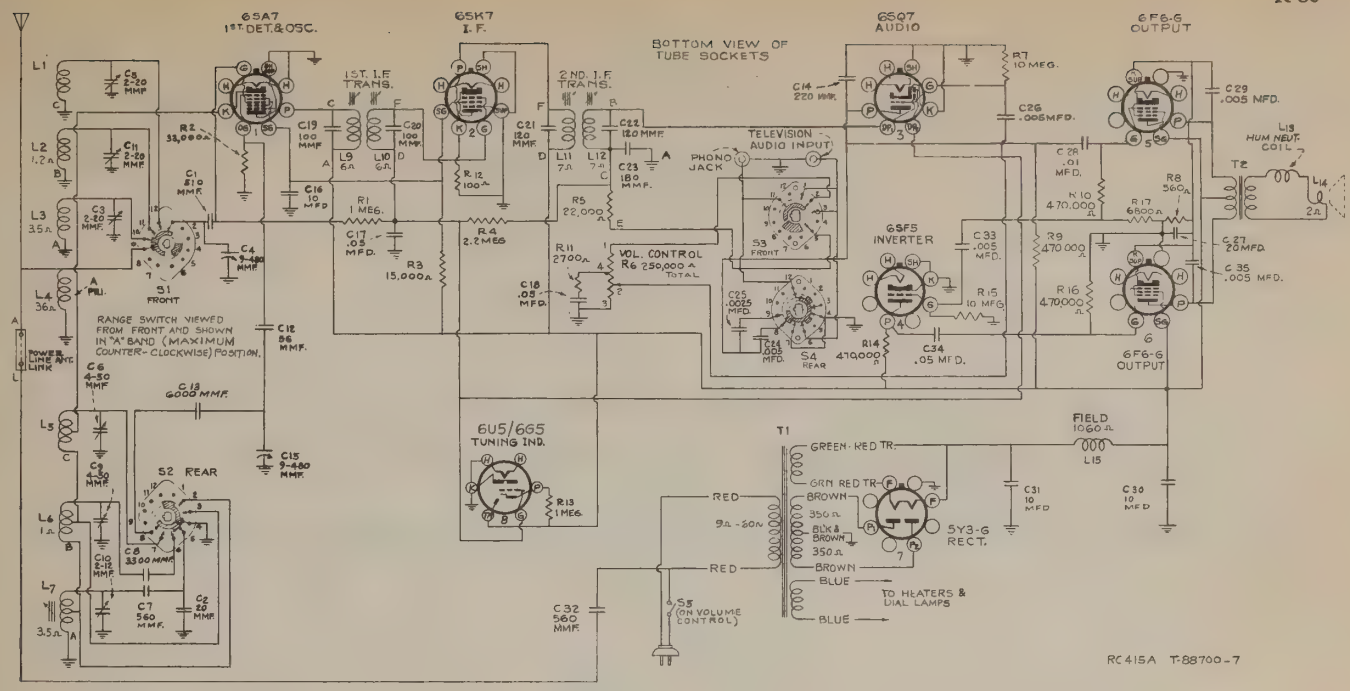


Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240
INTER-NATIONAL
EASTERN HEMISPHERE 40 M
HONG KONG - SPRINGFIELD - ROME
LONDON - SCHENECTADY - MADRID
RIO - BERLIN - PHILADELPHIA 31 M
BERLIN - TOKYO - PITTSBURGH
LONDON - ROME - PARIS
HUIZEN 25 M PRAGUE
LONDON - SCHEN'Y
BERLIN - PITTSB'GH
AM'TR 19 M PARIS
BERLIN - LONDON
N. YORK - PARIS
16 M HUIZEN
BERLIN - PITTSBURGH
LONDON - SCHEN'Y
13 M NEW YORK
7 8 9 10 12 14 16 18 20 22 MC
C
DOMESTIC
STANDARD BROADCAST
POLICE
550 600 700 800 1000 1200 1400 1700 KC
A
SPECIAL SERVICE
2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 7.0 7.5 MC
120 M TROPICAL BROADCAST AMERICAN POLICE
AIRCRAFT
90 M TROPICAL BROADCAST
AMATEUR
KHABAROVSK
60 M AIRCRAFT TROPICAL BROADCAST
49 M - CINCINNATI - TORONTO MEXICO CITY - CHICAGO - N. YORK HAVANA - BERLIN - PITTSBURGH
B
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240
27670

Receiver Dial Scales, and Corresponding 0-240° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 39.75° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."



Note: On some receivers the following circuit modifications are in effect:

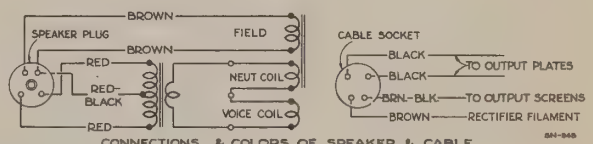
1. R11 is 5,600 ohms, and C18 is 0.1 mfd.
2. C1 is 470 mmfd.; R15 is 2,700 ohms and is connected from cathode of 6SF5 Inverter to ground; R17 is 15,000 ohms; and C33 is omitted.
3. There are three types of 2nd I-F transformers in use.

a. The first type (Stock No. 14308) has C23 and R5 mounted inside the case, and is connected exactly as shown above.

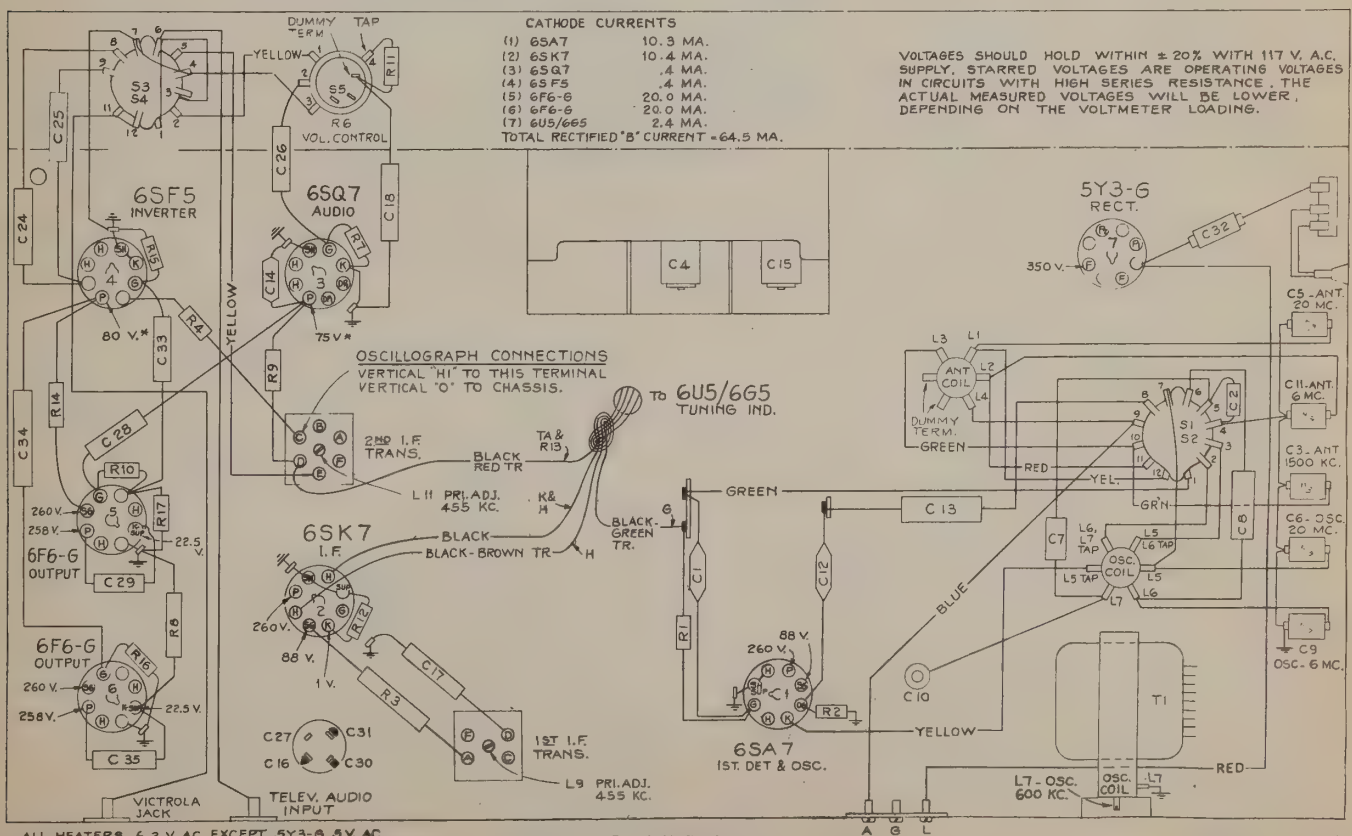
b. In the second type R5 is omitted and the lead from S4 connects to C instead of E. E is not used.

c. In the third type R5 is omitted and C23 is connected externally from C to ground. E is not used. The lead from the diode plate connects to A instead of B. When replacing this transformer with Stock No. 14308, remove the external C23 and connect the replacement transformer as shown in the above diagram.

Important: Stock No. 14308 is used as replacement for all three of the above types, and should be connected as shown in the diagram.

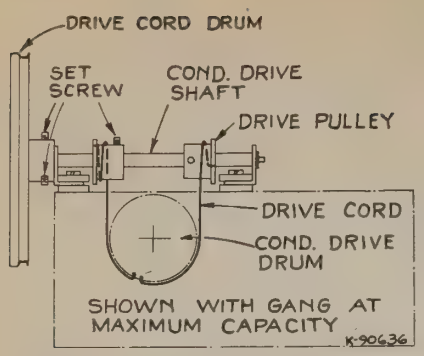


CONNECTIONS & COLORS OF SPEAKER & CABLE


CATHODE CURRENTS
(1) 6SA7 10.3 MA.
(2) 6SK7 10.4 MA.
(3) 6SQ7 .4 MA.
(4) 6SF5 .4 MA.
(5) 6F6-G 20.0 MA.
(6) 6F6-G 20.0 MA.
(7) 6U5/6G5 2.4 MA.
TOTAL RECTIFIED "B" CURRENT = 64.5 MA.
VOLTAGES SHOULD HOLD WITHIN ± 20% WITH 117 V. A.C. SUPPLY. STARRED VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE. THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL
VERTICAL "O" TO CHASSIS.
TO 6U5/6G5 TUNING IND.
6SF5 INVERTER
6SQ7 AUDIO
6SK7 I.F.
6F6-G OUTPUT
6SA7 1ST. DET & OSC.
5Y3-G RECT.
2ND I.F. TRANS.
1ST I.F. TRANS.
L11 PRI. ADJ. 455 KC.
L9 PRI. ADJ. 455 KC.
L7 - OSC. 600 KC.
VICTROLA JACK
TELEV. AUDIO INPUT
DUMMY TERM.
ANT COIL
OSC COIL
C5 - ANT. 20 MC.
C11 - ANT. 6 MC.
C3 - ANT. 1500 KC.
C6 - OSC. 20 MC.
C9 OSC - 6 MC.
BOTTOM VIEW - REAR OF CHASSIS
R-F WIRING & SOCKET VOLTAGES
RC-415A SN-944

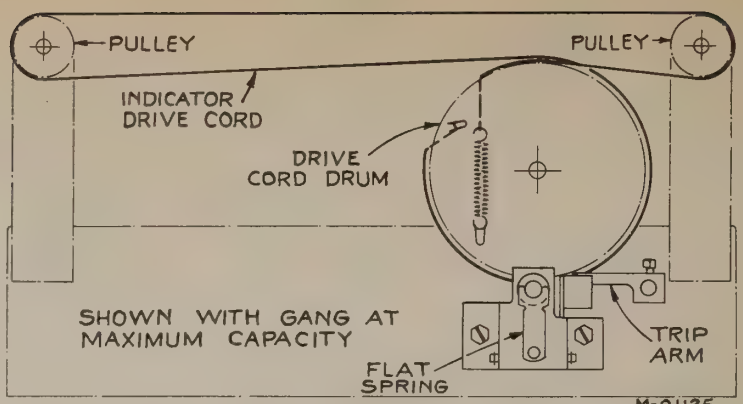
ALL HEATERS 6.2 V. AC., EXCEPT 5Y3-G, 5 V. AC.

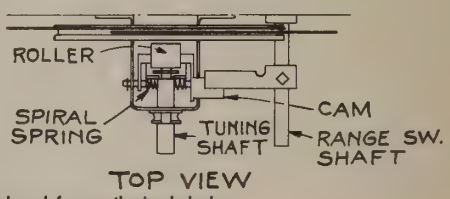
C-30 (2) RED + BUS to I.F. - 10 MFD.
C-16 GREEN to SG - 6SK7 - 10 mfd.
C-29 BUS to P. 6F6 - 10 mfd.
C-31 (2) RED + BRO. to Rect. 10 MFD.



CONDENSER DRIVE CORD ARRANGEMENT

Note: In the Dial Indicator Drive Cord Assembly drawing at the right the mechanism is shown with the range switch in the "A" band position. In this position the trip arm on the range shaft must be adjusted so that when the push-buttons are operated, the drive cord drum will turn freely without rubbing or binding against the drive roller.





DIAL INDICATOR DRIVE CORD ASSEMBLY.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-415A)
33620	Arm—Push arm and cam assembly on tuning unit—less lock screw
33432	Arm—Trip arm and set screw located on range switch shaft
33430	Board—Antenna and ground terminal board
30766	Cap—Rubber cap for Magic Eye—Model K80 only
12714	Capacitor—Air-trimmer, 2-12 mmfd. (C10)
33429	Capacitor—Trimmer capacitor bank, 2 sections 4-50 mmfd., and 3 sections 2-20 mmfd. (C3, C5, C6, C9, C11)
31871	Capacitor—20 mmfd. (C2)
12723	Capacitor—56 mmfd. (C12)
30904	Capacitor—100 mmfd. (C19, C20)
12404	Capacitor—120 mmfd. (C21, C22)
14712	Capacitor—180 mmfd. (C23)
30232	Capacitor—220 mmfd. (C14)
30608	Capacitor—510 mmfd. (C1)
31433	Capacitor—560 mmfd. (C7)
12537	Capacitor—560 mmfd. (C32)
31403	Capacitor—3,300 mmfd. (C8)
31405	Capacitor—6,000 mmfd. (C13)
4838	Capacitor—.005 mfd. (C24, C26, C29, C33, C35)
4937	Capacitor—.01 mfd. (C28)
32787	Capacitor—.05 mfd., 400 V. (C17, C34)
32786	Capacitor—0.1 mfd. (C18)
33014	Capacitor—Electrolytic, 3 sections 10 mfd., one section 20 mfd. (C16, C27, C30, C31)
32821	Coil—Antenna coil (L1, L2, L3, L4)
32824	Coil—Oscillator coil (L5, L6, L7)
33424	Control—Tone control (S3, S4)
33425	Control—Volume control and power switch (R6, S5)
32635	Cord—Condenser drive cord
32634	Cord—Drive cord
32713	Core—Adjustable core and stud for oscillator coil
33627	Drum—Condenser drive drum
33174	Drum—Drive cord drum with set screws and calibrator dial
11891	Lamp—Dial lamp
33625	Plate—Front guide plate for push arms
5040	Plug—4-contact female for speaker cable
33427	Pulley—Drive cord pulley and mounting bracket
33626	Pulley—Drive pulley—less bronze drive cord
14439	Resistor—100 ohms, ½ watt (R12)
30735	Resistor—560 ohms, 1 watt (R8)
13714	Resistor—5,600 ohms, ½ watt (R11)
12265	Resistor—6,800 ohms, ½ watt (R17)
33489	Resistor—15,000 ohms, 2.5 watt (R3)
14284	Resistor—22,000 ohms, 1/10 watt (R5)
12454	Resistor—33,000 ohms, ½ watt (R2)
12285	Resistor—470,000 ohms, ½ watt (R9, R10, R14, R16)
12013	Resistor—1 meg., 1/10 watt (R13)
13730	Resistor—1 meg., ½ watt (R1)
12679	Resistor—2.2 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R7, R15)
30340	Retainer—Retainer for shaft of tuning shaft cam and arm
33419	Roller—Friction roller for tuning knob shaft
4669	Screw—No. 8-32 square head set screw for drum
33621	Screw—Push arm lock screw
33624	Shaft—Tuning condenser drive shaft and washer
33422	Shaft—Tuning shaft—less friction roller
31364	Socket—Dial lamp socket
13871	Socket—Magic Eye tube socket
14278	Socket—Phonograph or Television input socket
31319	Socket—Tube socket
33175	Spring—Drive cord tension spring
33623	Spring—Drive drum cord spring
33622	Spring—Push arm return spring
33421	Spring—Tuning shaft flat spring
33420	Spring—Tuning shaft cam spiral spring
33426	Switch—Range switch (S1, S2)
33428	Transformer—First i-f transformer (L9, L10, C19, C20)
14308	Transformer—Second i-f transformer (L11, L12, C21, C22, C23, R5)
33618	Transformer—Power transformer—105-120 volts, 25 cycle (T1)
33112	Transformer—Power transformer—105-120 volts, 50-60 cycle (T1)
	SPEAKER ASSEMBLIES (RL-70J1)
31825	Cap—Cone center dust cap
11469	Coil—Hum neutralizing coil (L13)
33116	Coil—Speaker field coil (L15)
31275	Cone—Speaker cone, voice coil, and dust cap (L14)
5039	Plug—4-prong male, for speaker
33444	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33473	Button—Push button
30716	Clip—Magic Eye clip
33437	Dial—Dial scale (glass)
33439	Escutcheon—Dial escutcheon—less push buttons
33435	Frame—Dial scale holder, mounting brackets, pointer, and Magic Eye bracket and clip assembled—less dial
34383	Indicator—Dial pointer, carriage, and clip
33434	Knob—Volume control, tone control, range switch, or station selector knob
33431	Link—Link for "Antenna-Ground" terminal board
33842	Marker—Station selectors call letter markers
33438	Screw—Thumb screw for Magic Eye clip
34143	Shaft—Pointer carriage slide rod
14270	Spring—Retaining spring for knob

RCA Victor

MODEL T-80

Chassis No. RC-416A

Eight-Tube, Three-Band, AC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 26—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

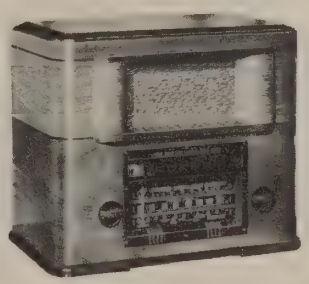
FREQUENCY RANGES

Standard Broadcast	540-1,720 kc
Medium Wave	2.3-7.0 mc
Short Wave	7.0-22.0 mc
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SA7 .... 1st. Detector-Oscillator
(2) RCA-6SK7 ..... I-F Amplifier
(3) RCA-6SQ7 ..... 2nd. Detector, A.V.C., and A-F Amplifier
(4) RCA-6SF5 ..... Inverter
(5) RCA-6F6-G ..... Output
(6) RCA-6F6-G ..... Output
(7) RCA-5Y3-G ..... Rectifier
(8) RCA-6U5/6G5 ..... Tuning Indicator

PILOT LAMPS (2)..... Mazda No. 44, 6.3 volts, 0.25 amp.



POWER OUTPUT RATING

Undistorted	5.0 watts
Maximum	5.5 watts

LOUDSPEAKER (RL-79-5)

Type	6-inch electrodynamic
V.C. Impedance	3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating "A"	105-125 volts, 50-60 cycles, 85 watts
Rating "B"	105-125 volts, 25-60 cycles, 85 watts
Rating "C"	100-130, 140-160, 195-250 volts, 40-60 cycles, 85 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	13 15/16	16½	9 13/16
Chassis Base Dimensions (inches)	2 ¾	12 ¼	7
Over-all Chassis Height	7 inches		
Weight	22 lbs, (Net), 26 lbs. (Shipping)		
Tuning Drive Ratio	10 to 1		

Push Button Adjustment

The push-buttons should be adjusted for six favorite stations after the receiver is operating, and has had a brief warm-up period.

Any standard broadcast stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-button screws in back of the station-marker recesses.
2. Set Accessory-Tone Knob to "Radio" and turn the range selector to "A," so that the "A" band indicator lights up.
3. Press in the tuning knob and accurately tune in the first station.
4. With station accurately tuned in, press in the first push-button and tighten the screw.
5. Place the station marker tab in the recess.
6. Proceed in a similar manner to adjust the remainder of the push-buttons.

First Edition

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

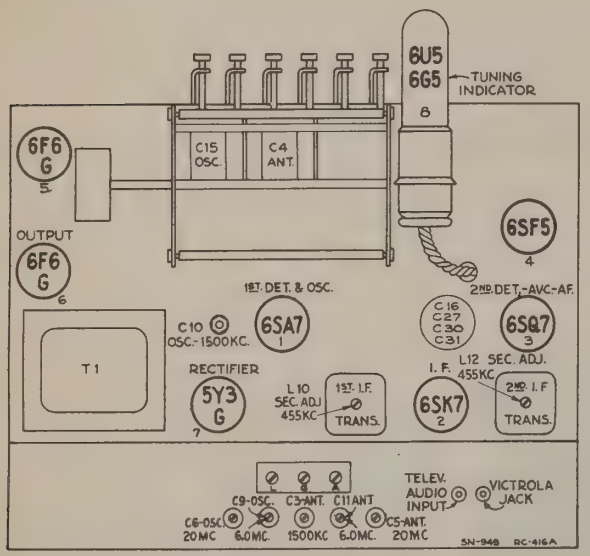
Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord-Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 240° mark on the drum scale must be vertical and directly above the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.



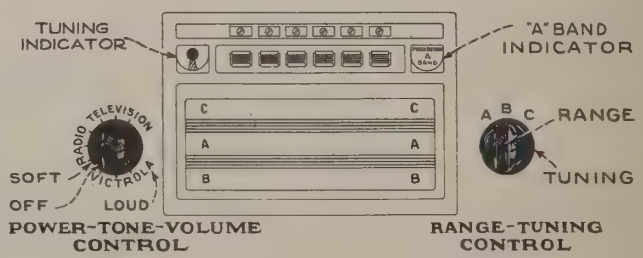
Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 240° mark on the calibration scale when the plates are fully meshed.

Steps	Connect the high side of the test-osc. to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 grid in series with .01 mfd.	455 kc	"A" Band Quiet Point between 550-750 kc	L11 and L12 (2nd I-F Trans.)
2	6SA7 grid in series with .01 mfd.			L9 and L10 (1st I-F Trans.)
3	Ant. terminal in series with 300 ohms	20 mc	20 mc (40°) "C" Band	C6 (osc.)* C5 (ant.)
4		6 mc	6 mc (52.5°) "B" Band	C9 (osc.)** C11 (ant.)
5	Ant. terminal in series with 200 mmfd.	1,500 kc	1,500 kc (41.75°) "A" Band	C10 (osc.) C3 (ant.)
6		600 kc	600 kc (200.25°) "A" Band	L7 (osc.) Rock Gang
7	Repeat step 5.			

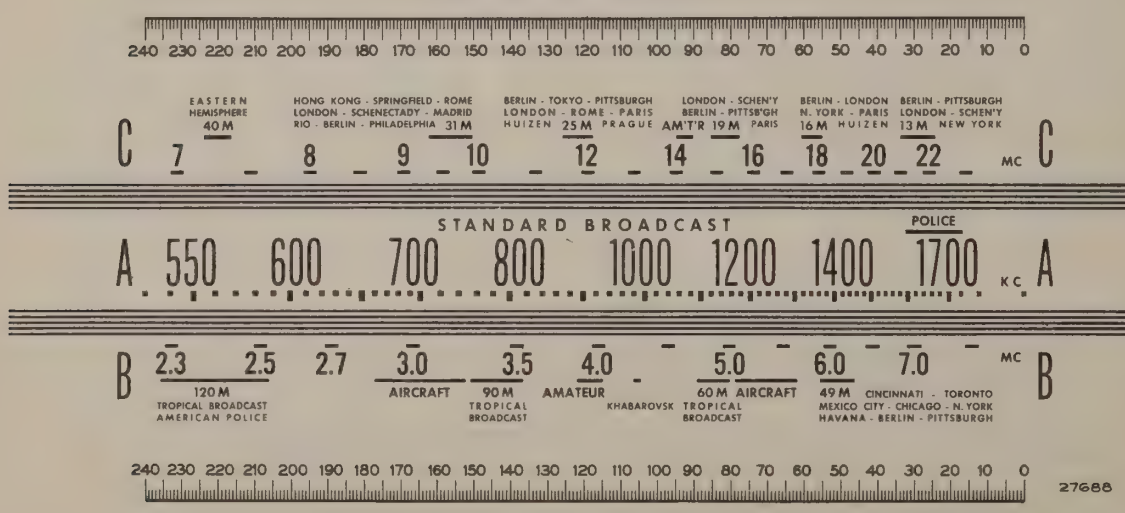
* Use **minimum** capacity peak if two can be obtained. Check to determine that C6 has been adjusted to correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

** Use **minimum** capacity peak if two can be obtained. Check to determine that C9 has been adjusted to correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

Note: Oscillator tracks above signal on all bands.

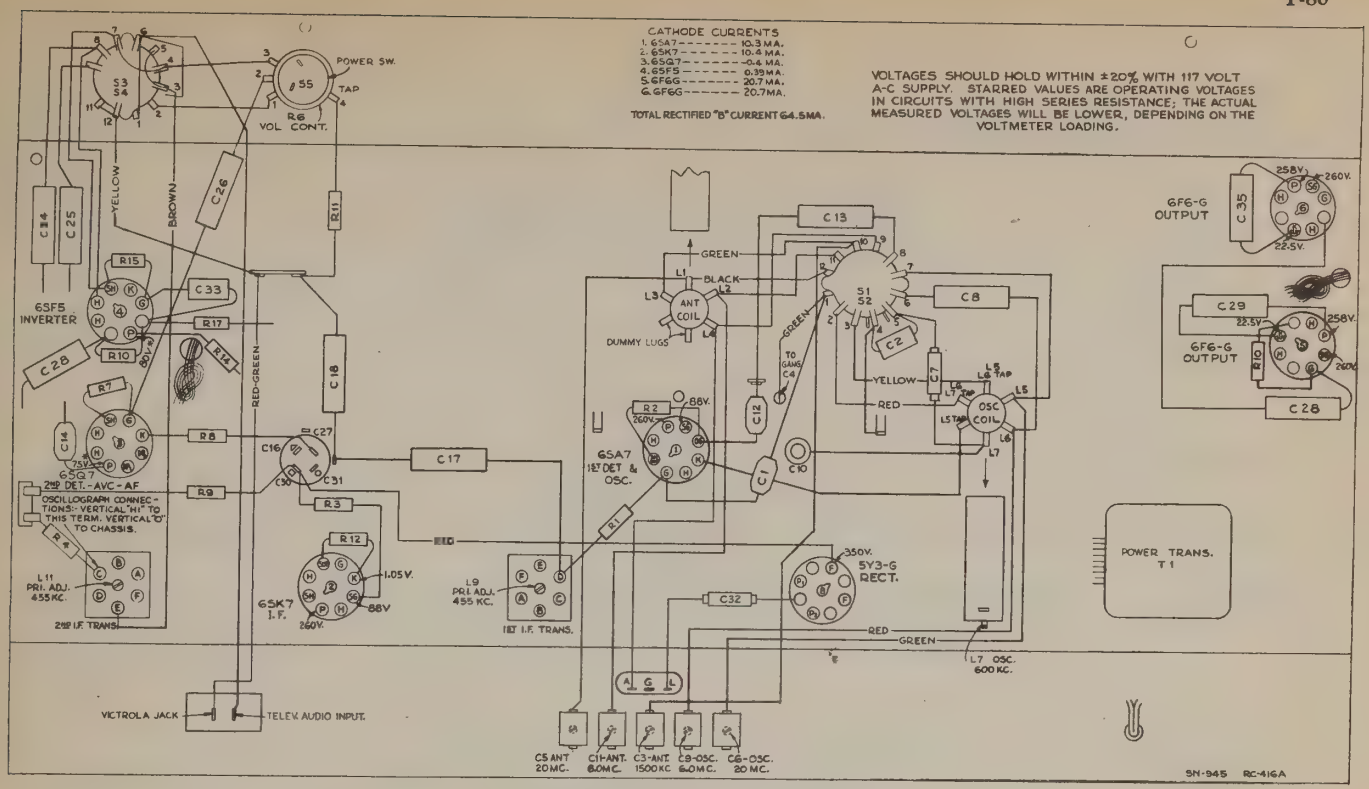


Calibration Scale


240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
EASTERN HEMISPHERE 40 M
HONG KONG - SPRINGFIELD - ROME
LONDON - SCHENECTADY - MADRID
RIO - BERLIN - PHILADELPHIA 31 M
BERLIN - TOKYO - PITTSBURGH
LONDON - ROME - PARIS
HUIZEN 25 M PRAGUE
LONDON - SCHEN'Y
BERLIN - PITTSB'GH
AM'T'R 19 M PARIS
BERLIN - LONDON
N. YORK - PARIS
16 M HUIZEN
BERLIN - PITTSBURGH
LONDON - SCHEN'Y
13 M NEW YORK
C 7 8 9 10 12 14 16 18 20 22 MC C
STANDARD BROADCAST
POLICE
A 550 600 700 800 1000 1200 1400 1700 KC A
B 2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 7.0 MC B
120 M TROPICAL BROADCAST AMERICAN POLICE
AIRCRAFT
90 M TROPICAL BROADCAST
AMATEUR
KHABAROVSK
60 M AIRCRAFT TROPICAL BROADCAST
49 M CINCINNATI - TORONTO
MEXICO CITY - CHICAGO - N. YORK
HAVANA - BERLIN - PITTSBURGH
240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
27688

Receiver Dial Scales, and Corresponding 0-240° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 200.25° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."


CATHODE CURRENTS
1. 6SA7 ------- 10.3 MA.
2. 6SK7 ------- 10.4 MA.
3. 6SQ7 ------- 0.4 MA.
4. 6SF5 ------- 0.39 MA.
5. 6F6G ------- 20.7 MA.
6. 6F6G ------- 20.7 MA.
TOTAL RECTIFIED "B" CURRENT 64.5 MA.
VOLTAGES SHOULD HOLD WITHIN ±20% WITH 117 VOLT A-C SUPPLY. STARRED VALUES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE; THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.
POWER SW.
TAP
R6 VOL CONT.
6SF5 INVERTER
6SQ7 2ND DET. - AVC - AF
OSCILLOGRAPH CONNECTIONS: VERTICAL "H" TO THIS TERM. VERTICAL "G" TO CHASSIS.
2ND I.F. TRANS.
6SK7 I. F.
1ST I.F. TRANS.
6SA7 1ST DET. & OSC.
ANT COIL
DUMMY LUGS
OSC COIL
6F6-G OUTPUT
5Y3-G RECT.
POWER TRANS. T1
VICTROLA JACK
TELEV. AUDIO INPUT.
C5 ANT 20 MC.
C1 ANT. 6.0 MC.
C3 ANT. 1500 KC
C2 OSC. 6.0 MC.
C6 OSC. 20 MC.
L7 OSC. 600 KC.
SN-945 RC-416A

BOTTOM VIEW—REAR OF CHASSIS

RF WIRING & SOCKET VOLTAGES

Note: On some receivers the following circuit modifications are in effect:

1. R11 is 5,600 ohms, and C18 is 0.1 mfd.

2. C1 is 470 mfd.; R15 is 2,700 ohms and is connected from cathode of 6SF5 Inverter to ground; R17 is 15,000 ohms; and C33 is omitted.

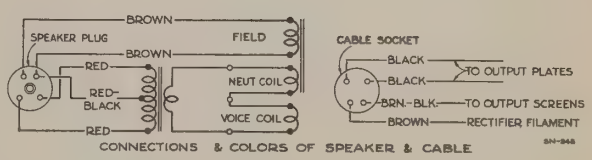
3. There are three types of 2nd I-F transformers in use.

a. The first type (Stock No. 14308) has C23 and R5 mounted inside the case, and is connected exactly as shown below.

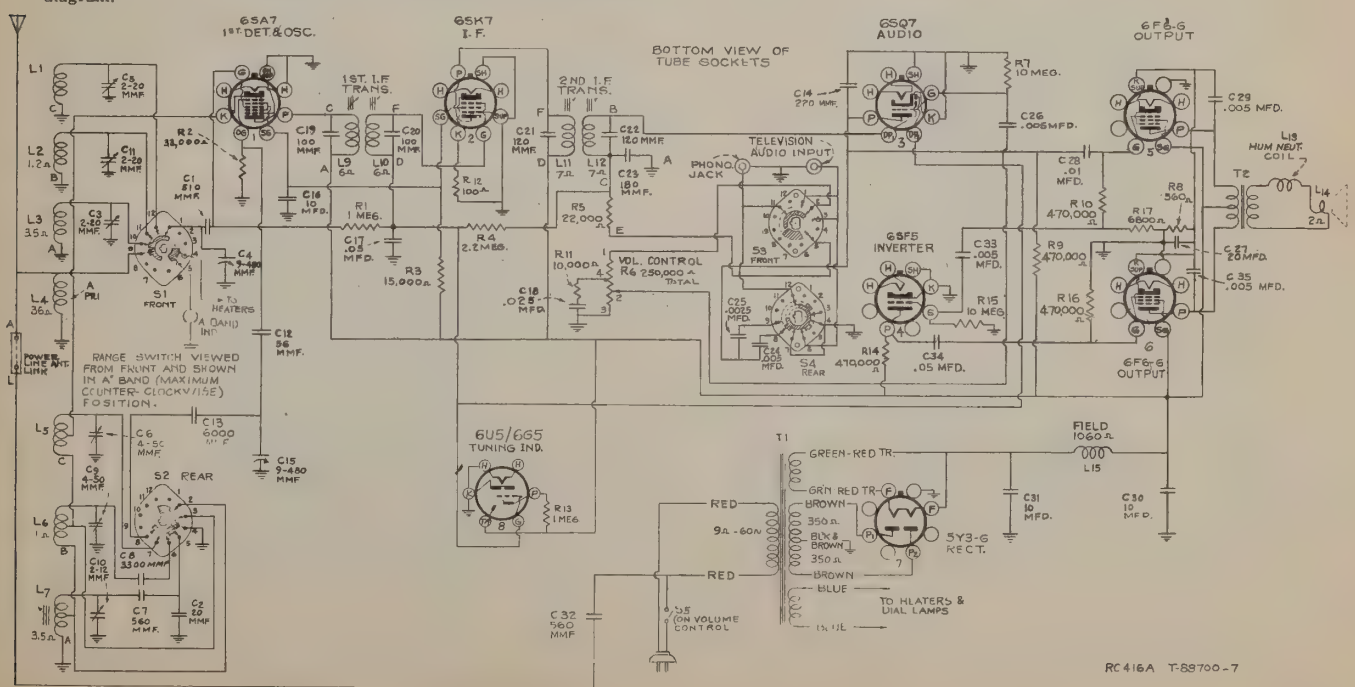
b. In the second type R5 is omitted and the lead from S4 connects to C instead of E. E is not used.

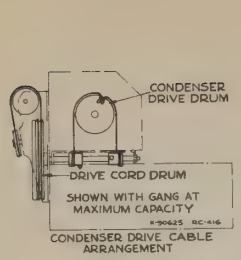
c. In the third type R5 is omitted and C23 is connected externally from C to ground. E is not used. The lead from the diode plate connects to A instead of B. When replacing this transformer with Stock No. 14308, remove the external C23 and connect the replacement transformer as shown in the schematic diagram.

Important: Stock No. 14308 is used as replacement for all three of the above types, and should be connected as shown in the schematic diagram.

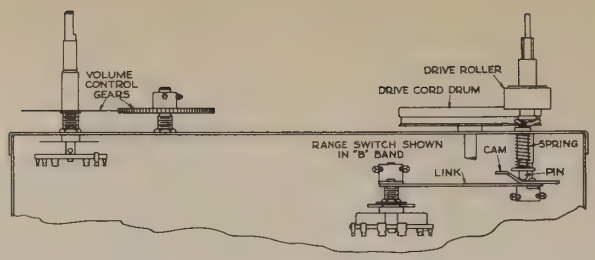


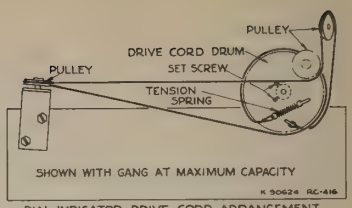
CONNECTIONS & COLORS OF SPEAKER & CABLE





CONDENSER DRIVE CABLE ARRANGEMENT





DIAL INDICATOR DRIVE CORD ARRANGEMENT

Note: Adjustment of the link and cam should be such that in the "A" band position when the push-buttons are operated, the drive cord drum will turn freely without rubbing or binding against the drive roller.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-416A)
33620	Arm—Push arm and cam assembly on tuning unit—less lock screw
33430	Board—Antenna and ground terminal board
34268	Cap—Rubber cap for tuning tube
12714	Capacitor—Air trimmer, 2-12 mmfd. (C10)
33429	Capacitor—Trimmer capacitor bank, two 4-50 mmfd., three 2-20 mmfd., sections (C3, C5, C6, C9, C11)
32792	Capacitor—25 mmfd. (C2)
12723	Capacitor—56 mmfd. (C12)
30904	Capacitor—100 mmfd. (C19, C20)
12404	Capacitor—120 mmfd. (C21, C22)
14712	Capacitor—180 mmfd. (C23)
12694	Capacitor—220 mmfd. (C14)
30433	Capacitor—470 mmfd. (C1)
12537	Capacitor—560 mmfd. (C32)
31433	Capacitor—560 mmfd. (C7)
31403	Capacitor—3,300 mmfd. (C8)
31405	Capacitor—6,000 mmfd. (C13)
5107	Capacitor—.0025 mfd. (C25)
4838	Capacitor—.005 mfd. (C24, C26, C29, C33, C35)
4937	Capacitor—.01 mfd. (C28)
4870	Capacitor—.025 mfd. (C18)
32787	Capacitor—.05 mfd. (C17, C34)
33014	Capacitor—Electrolytic, three 10 mfd., and one 20 mfd. sections (C16, C27, C30, C31)
33508	Clip—Magic Eye mounting clip and bracket
32821	Coil—Antenna coil (L1, L2, L3, L4)
32824	Coil—Oscillator coil (L5, L6, L7)
32635	Cord—Condenser drive cord
32634	Cord—Drive cord
32713	Core—Adjustable core and stud for oscillator coil
33627	Drum—Condenser drive drum
34267	Drum—Drive cord drum
33186	Gear—Volume control knob shaft and gear
33185	Gear—Volume control gear and hub, with set screws
11891	Lamp—Dial lamp
33431	Link—Antenna and ground terminal board link
34041	Link—Link complete with arm and cam for operating range switch
33628	Plate—Front guide plate for push arms
13871	Plug—Eye cable plug
5040	Plug—Speaker cable plug
33509	Pulley—Drive cord pulley and bracket (1 pulley)
33510	Pulley—Drive cord pulleys and bracket (2 pulleys)
33626	Pulley—Drive pulley
14439	Resistor—100 ohms, ½ watt (R12)
30735	Resistor—560 ohms, 1 watt (R8)
12265	Resistor—6,800 ohms, ½ watt (R17)
14559	Resistor—10,000 ohms, ½ watt (R11)
33489	Resistor—15,000 ohms, 2.5 watts (R3)
14284	Resistor—22,000 ohms, 1/10 watt (R5)
12454	Resistor—33,000 ohms, ½ watt (R2)
12285	Resistor—470,000 ohms, ½ watt (R9, R10, R14, R16)
12013	Resistor—1 meg., 1/10 watt (R13)
13730	Resistor—1 meg., ½ watt (R1)
12679	Resistor—2.2 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R7, R15)
14343	Retainer—Retaining ring for volume control knob shaft
34040	Ring—Retaining ring for tuning shaft
4669	Screw—No. 8-32 sq. hd. set screw for volume control gear and drum
33621	Screw—Push arm lock screw
34039	Shaft—Range switch knob shaft
33624	Shaft—Tuning condenser drive shaft and washer
34038	Shaft—Tuning knob shaft with rubber drive roller and pulley assembled
33545	Shield—Dial lamp shield
31364	Socket—Dial lamp socket
33514	Socket—Phonograph and Television socket
31319	Socket—Tube socket
33544	Spring—Drive cord tension spring
33623	Spring—Drive drum cord spring
33622	Spring—Push arm return spring
34042	Spring—Spring and pin for range switch shaft
33515	Spring—Tension spring for spring and pin
33513	Switch—Range switch (S1, S2)
33511	Tone Control, Television and Phono switch (S3, S4)
33428	Transformer—First i-f transformer (L9, L10, C19, C20)
14308	Transformer—Second i-f transformer (L11, L12, C21, C22, C23, R5)
33619	Transformer—Power transformer 105-120 volts, 25-60 cycles (T1)
33112	Transformer—Power transformer 105-120 volts, 50-60 cycles (T1)
31446	Transformer—Power transformer—Universal—60 cycle (T1)
33512	Volume control and power switch (R6, S5)
33726	Washer—"C" washer for spring and pin
34037	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLIES (RL79-5)
32907	Cap—Cone center dust cap
32906	Coil—Hum neutralizing coil
33547	Coil—Speaker field coil
5039	Plug—4-prong male speaker connection plug
33599	Transformer—Speaker output transformer
	MISCELLANEOUS ASSEMBLIES
33474	Button—Push button
33552	Dial—Glass dial scale
33549	Escutcheon—Dial and push button escutcheon—less buttons and screen
33551	Frame—Dial frame, holder, and pointer assembled—less dial
33842	Marker—Station selector call letter markers
33550	Screen—"Push Button "A" Band" marker screen
30330	Spring—Retaining spring for knob, Stock No. 33470
14270	Spring—Retaining spring for knob, Stock No. 33553 and Stock No. 33471
4982	Spring—Retaining spring for knob, Stock No. 33505

RCA Victor

MODELS 98T and 98K2

Chassis No. RC-386A and RC-386A

Eight-Tube, Three-Band, Electric-Tuning, A-C, Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 2—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGES

"Standard Broadcast" (A)	540-1,720 kc
"Medium Wave" (B)	2.3-7 mc
"Short Wave" (C)	7-22 mc
Six Electric Tuning Positions	550-1,500 kc
2 stations between approximately 550- 950 kc (Buttons 1 and 2)	
2 stations between approximately 690-1,225 kc (Buttons 3 and 4)	
2 stations between approximately 890-1,500 kc (Buttons 5 and 6)	
Intermediate Frequency	455 kc

RCA TUBE COMPLEMENT

(1) RCA-6A8-G	First Detector—Oscillator
(2) RCA-6K7	Intermediate-Frequency Amplifier
(3) RCA-6Q7-G	Second Detector, 1st A-F, and A.V.C.
(4) RCA-6J5	Phase Inverter
(5) RCA-6K6-G	Power Output
(6) RCA-6K6-G	Power Output
(7) RCA-6U5	"Magic Eye" Tuning Indicator
(8) RCA-5Y3-G	Rectifier
Pilot Lamps (2)	Mazda 44, 6.3 volts, 0.25 amp.

POWER SUPPLY RATINGS

A	105-125 volts, 50-60 cycles, 115 watts
B	105-125 volts, 25-60 cycles, 115 watts
C	100-130/140-160/200-250 volts, 40-60 cycles, 115 watts

POWER OUTPUT

Undistorted	5 watts
Maximum	5.5 watts

LOUDSPEAKER

Type	Electrodynamic
Diameter	98T, 6 inches; 98K2, 12 inches
Voice Coil Impedance	2.2 ohms at 400 cycles

	Model 98T	Model 98K2
Height	12⅞ inches	42 inches
Width	18⅜ inches	27½ inches
Depth	9⅜ inches	15¼ inches
Net Weight	21 pounds	55 pounds
Shipping Weight	28 pounds	73 pounds
Chassis Base Dimensions	13 in. x 6½ in. x 2½ in.	
Over-all Chassis Height		6½ inches
Tuning Drive Ratio		12 to 1

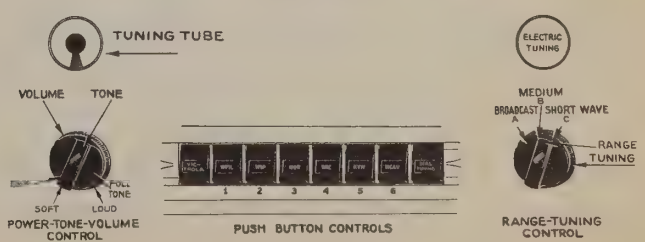
General Description

The 98T is a table model; the 98K2 a console model. Both models have a "Magic Eye" tuning tube and illuminated indicator to show when the set is being operated on electric tuning. All models have electric tuning for six stations in the standard broadcast range.

Features of design include: Magnetite-core electric-tuning coils; magnetite-core i-f transformers; temperature-compensated capacitor in the oscillator circuit; aural-compensated volume control; high-frequency tone control; jack and switch for Victrola attachment; straight-line dial; dust-proof electrodynamic loudspeaker.

Model 98K2

Model 98T



Location of Controls

The left-hand push button is a Victrola-Attachment switch. The right-hand push button is for dial tuning.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The distance from the front of the chassis to the drum must not exceed ⅛-inch. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

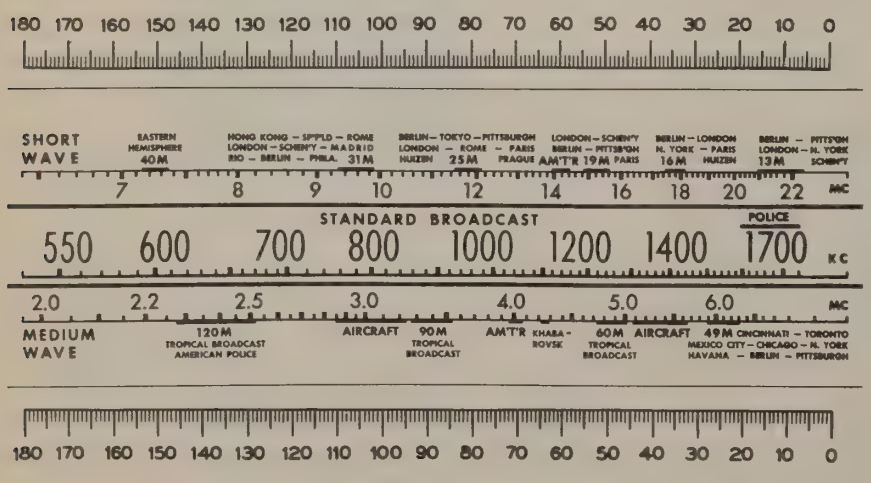
Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio-dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	"A" band, Quiet Point between 550-750 kc	L12 and L13 (2nd I-F Transformer)
2	6A8G det. grid cap, in series with .01 mfd.	455 kc		L10 and L11 (1st I-F Transformer)
3	Antenna Terminal, in series with 200 mmf.	600 kc	600 kc (150.5°) "A" band	L9
4		1,500 kc	1,500 kc (28°) "A" band	C25 (osc.) C30 (ant.)
5	Repeat steps 3 and 4.			
6	Antenna Terminal, in series with 400 ohms.	6 mc	6 mc (26.5°) "B" band	C23 (osc.)*
7		20 mc	20 mc (22°) "C" band	C21 (osc.)*
8	Follow "Adjustments for Electric Tuning."			

*Use minimum capacity peak if two peaks can be obtained, and rock gang condenser slightly while adjusting C23 and C21.

Note.—Oscillator tracks 455 kc above signal on all bands.

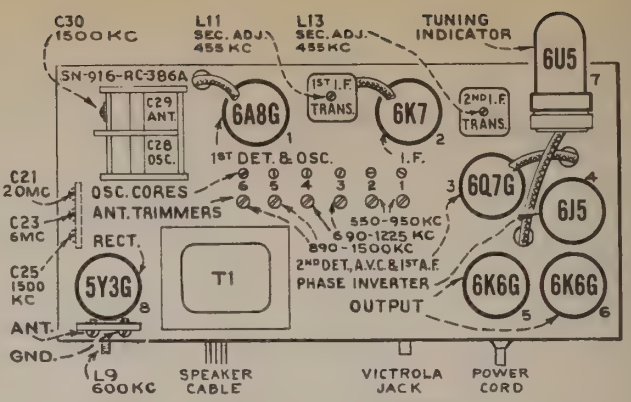
Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, move the dial indicator on the drive cable to the left-hand end mark on dial, with gang condenser fully meshed.

For additional details, refer to booklet "RCA Victor Receiver Alignment."


180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
SHORT WAVE
EASTERN HEMISPHERE 40M
HONG KONG – SP'FLD – ROME LONDON – SCHEN'Y – MADRID RIO – BERLIN – PHILA. 31M
BERLIN – TOKYO – PITTSBURGH LONDON – ROME – PARIS HUIZEN 25M PRAGUE
LONDON – SCHEN'Y BERLIN – PITTSBURGH AM'T'R 19M PARIS
BERLIN – LONDON N. YORK – PARIS 16M HUIZEN
BERLIN – PITTSB'GH LONDON – N. YORK 13M SCHEN'Y
7 8 9 10 12 14 16 18 20 22 MC
STANDARD BROADCAST
POLICE
550 600 700 800 1000 1200 1400 1700 KC
2.0 2.2 2.5 3.0 4.0 5.0 6.0 MC
MEDIUM WAVE
120M TROPICAL BROADCAST AMERICAN POLICE
AIRCRAFT
90M TROPICAL BROADCAST
AM'T'R KHABA – ROVSK
60M TROPICAL BROADCAST
AIRCRAFT
49M CINCINNATI – TORONTO MEXICO CITY – CHICAGO – N. YORK HAVANA – BERLIN – PITTSBURGH
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example; 28° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."



Tube and Trimmer Locations

Adjustments for Electric Tuning

These models have eight push buttons. The left-hand button is a Victrola switch. The right-hand button connects the gang condenser for manual tuning. The other six buttons are for electric tuning of six different stations in the standard-broadcast range. The station buttons connect to separate magnetite-core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31031. Allow at least five minutes warm-up period before making adjustments.

The procedure is as follows:

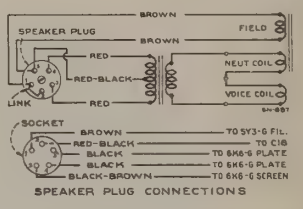
1. Make a list of the desired six stations, arranged in order from low to high frequencies.
2. Push in the dial-tuning button, and manually tune in the first station on the list.
3. Push in station button No. 1 (second from left) and adjust No. 1 oscillator core (L37) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until station is received.
4. Adjust No. 1 antenna trimmer (C36) for maximum output on this station.

Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.

5. Adjust for each of the remaining five stations in the same manner.
6. Make a final careful adjustment of the oscillator cores and antenna trimmers.

Precautionary Lead Dress.—

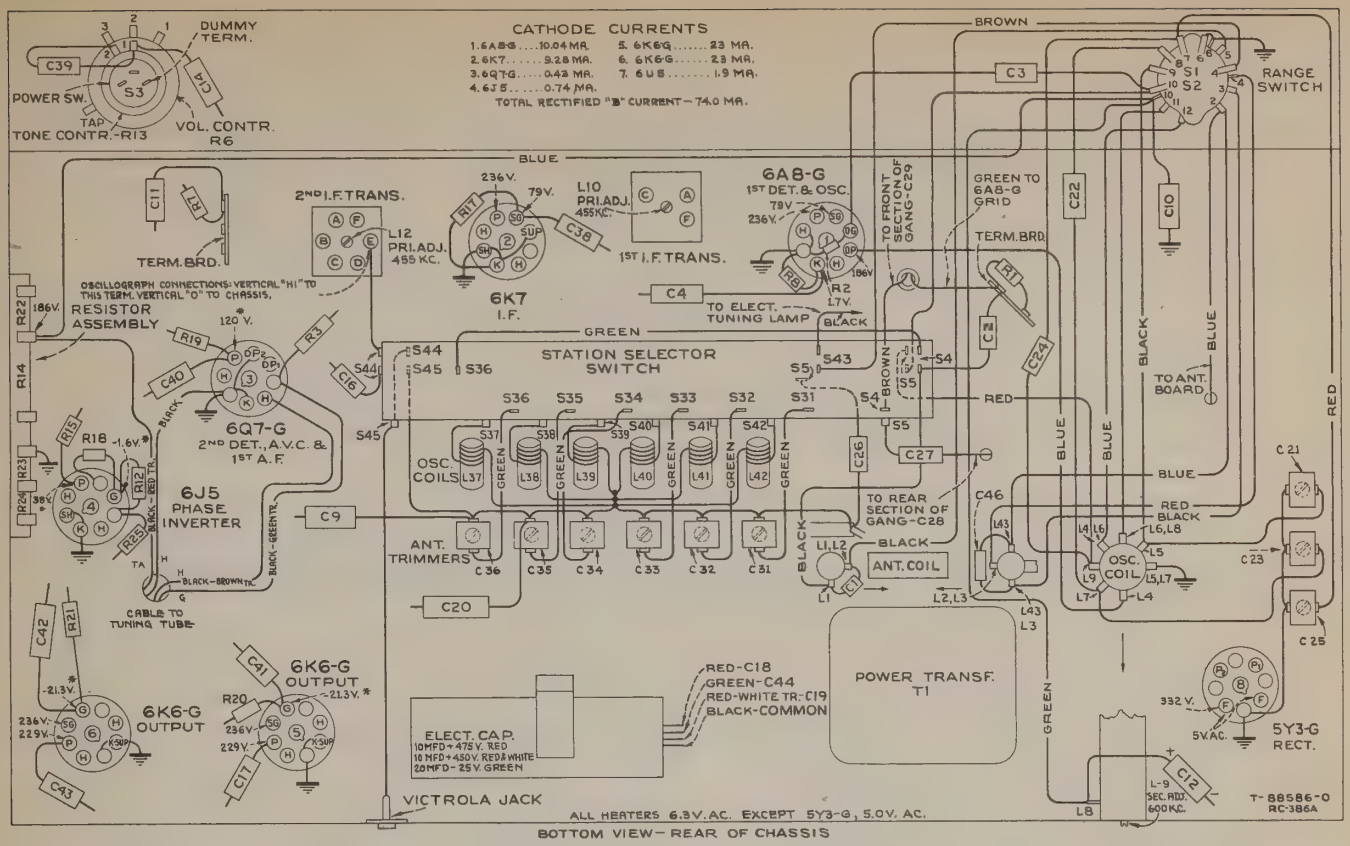
1. Dress red leads from power transformer to power switch (S3), in corner of chassis and away from volume control terminals.
2. Dress brown lead from push-button switch to gang over end of switch, and away from C27 and bus between S5 and range switch.
3. Leads to C27 must be as short as possible.
4. Blue lead from range switch to oscillator coil must be as short as possible and dressed away from other leads. All leads should be dressed away from antenna coil.
5. Leads across back of chassis must be dressed under electrolytic away from Victrola jack.
6. Parts and leads should be dressed away from R22-R14 as it becomes heated.
7. Leads from oscillator coil to trimmers must be dressed away from coil.
8. Green lead from S4 to range switch must be clear of other leads and away from front edge of chassis.



Connections and Colors of Loudspeaker and Cable

Loudspeaker.—The loudspeaker cone may be centered in the usual manner with three celluloid or paper feelers after gently cutting away the front dust cover. A new cover should be cemented in place upon completion of the adjustment.

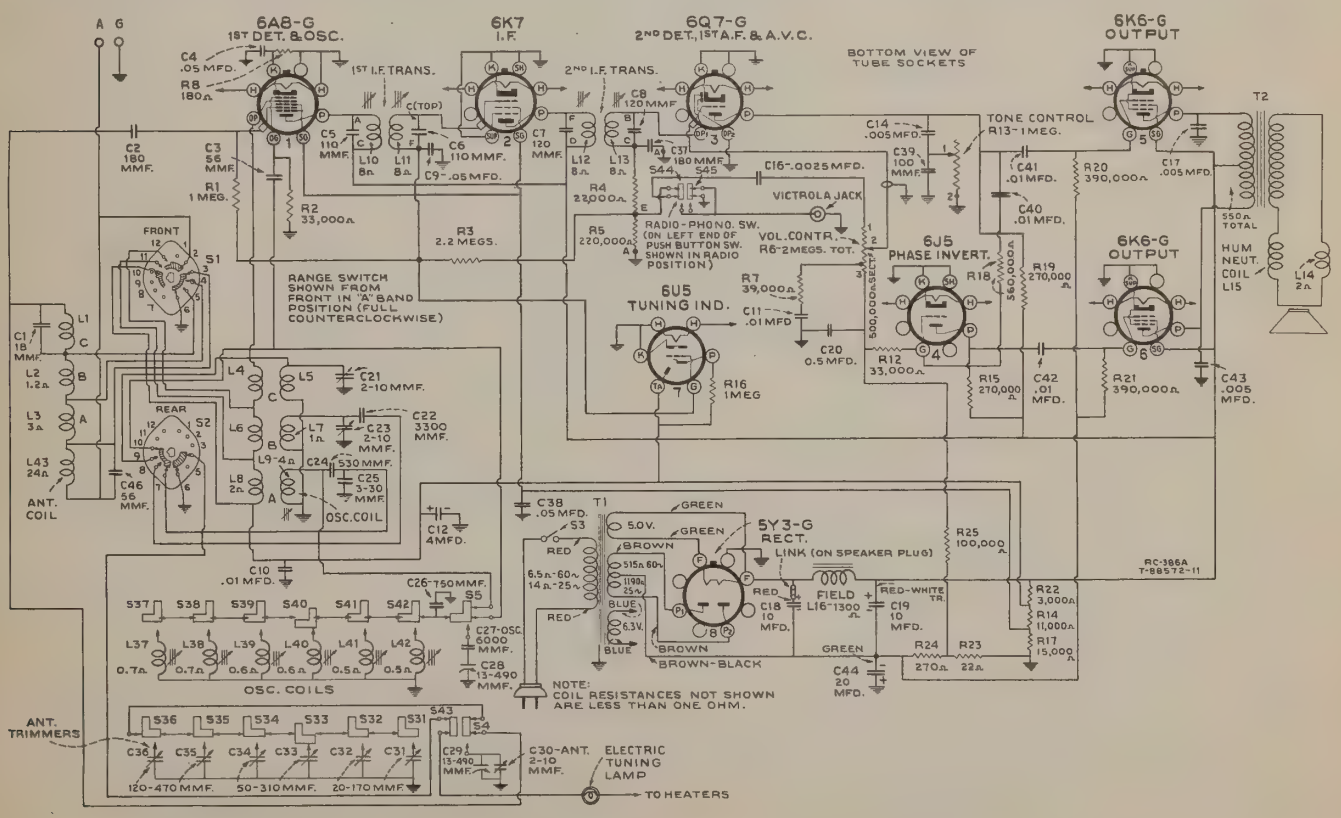
Victrola Attachment.—A jack is provided on the rear of the chassis for connection to a Victrola Attachment. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.



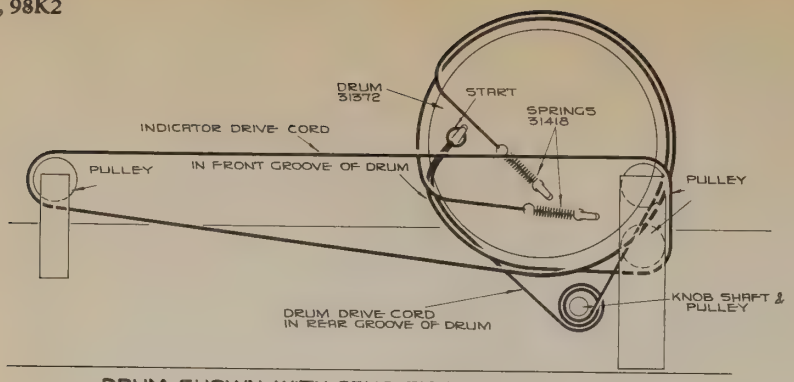
R-F Wiring Diagram and Socket Voltages

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ± 20% with 117-volt a-c supply.

***NOTE:** Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.

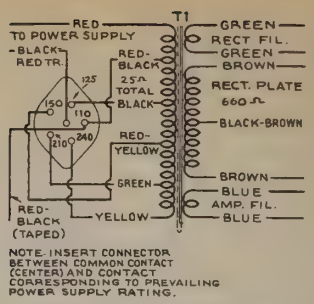


Schematic Circuit Diagram



DRUM SHOWN WITH GANG AT MAXIMUM CAPACITY

Arrangement of Drive Cords for Tuning Condenser and Dial Indicator



NOTE: INSERT CONNECTOR BETWEEN COMMON CONTACT (CENTER) AND CONTACT CORRESPONDING TO PREVAILING POWER SUPPLY RATING.

UNIVERSAL TRANS. CONNECTIONS

Above—Universal Power Transformer Connections. (110-volt supply for a Victrola Attachment may be obtained by connecting the motor to the red and the red-black leads.)

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-386-A)
30752	Bracket—Magic eye bracket and clip
14517	Board—"Antenna"—"Gnd" terminal board
30766	Cap—Rubber cap for magic eye
32142	Capacitor—Dry electrolytic capacitor comprising two 10 and one 20 mfd. sections (C18, C19, C44)
31400	Capacitor—Mica trimmer capacitor comprising two sections of 2-10 mmfd. and one section of 3-30 mmfd. (C21, C23, C25)
32486	Capacitor—Trimmer capacitor bank for push button switch (C31, C32, C33, C34, C35, C36)
12722	Capacitor—18 mmfd. (C1)
12723	Capacitor—56 mmfd. (C3, C46)
30406	Capacitor—100 mmfd. (C39)
14262	Capacitor—109 mmfd. (C5, C6)
12404	Capacitor—120 mmfd. (C7, C8)
14712	Capacitor—180 mmfd. (C37)
30232	Capacitor—180 mmfd. (C2)
32492	Capacitor—530 mmfd. (C24)
31435	Capacitor—750 mmfd. (C26)
4881	Capacitor—3300 mmfd. (C22)
31405	Capacitor—6000 mmfd. (C27)
5107	Capacitor—.0025 mfd., 700 volts (C16)
4838	Capacitor—.005 mfd., 1000 volts (C14, C17, C43)
4858	Capacitor—.01 mfd., 500 volts (C10, C40, C41, C42)
14393	Capacitor—.01 mfd., 300 volts (C11)
30882	Capacitor—.05 mfd., 200 volts (C4, C9, C38)
30867	Capacitor—.5 mfd., 200 volts (C20)
32145	Capacitor—4 mfd. (C12)
31382	Clip—Coil and core mounting clip for push button switch
32493	Coil—Antenna coil (L1, L2, L3, L43)
31951	Coil—Oscillator coil (L4, L5, L7, L9)
31385	Coil—Push button oscillator coil 550 to 950 kc. (L37, L38)
32487	Coil—Push button oscillator coil 690 to 1225 kc. (L39, L40)
31383	Coil—Push button oscillator coil 890 to 1500 kc. (L41, L42)
31369	Condenser—2-gang variable tuning condenser (C28, C29, C30)
32668	Control—Volume control, tone control and power switch (R6, R13, S3)
32634	Cord—Variable condenser drive or pointer indicator cord
12800	Core and Stud for oscillator coil Stock No. 31951
31372	Drum—Variable condenser drive cord drum
32552	Indicator—Indicator pointer assembly
11891	Lamp—Dial or electric tuning indicator lamp
32670	Plate—Dial color plate (Metal)
31373	Pulley—Pointer drive cord pulley (¾ in. dia.)
30545	Resistor—180 ohms, ½ watt (R8)
5114	Resistor—15,000 ohms, 1 watt (R17)
14284	Resistor—22,000 ohms, 1/10 watt (R4)
12454	Resistor—33,000 ohms, ½ watt (R2, R12)
12266	Resistor—39,000 ohms, ½ watt (R7)
14560	Resistor—100,000 ohms, ½ watt (R25)
11398	Resistor—220,000 ohms, 1/10 watt (R5)
12199	Resistor—270,000 ohms, ½ watt (R15, R19)
13479	Resistor—390,000 ohms, ½ watt (R20, R21)
12486	Resistor—560,000 ohms, ½ watt (R18)
13730	Resistor—1 meg., ½ watt (R1)
12013	Resistor—1 meg., 1/10 watt (R16)
12679	Resistor—2.2 meg., ½ watt (R3)
32143	Resistor—Voltage divider tapped at 22 ohm, 270 ohm, 3000 ohm, 11,000 ohm. (R14, R22, R23, R24)
14887	Retainer—Retainer for pointer indicator drive cord pulley
14343	Retainer—Retaining ring for tuning knob shaft
4669	Screw—No. 8-32 set screw for variable condenser drive cord drum
32671	Shaft—Tuning drive shaft and pulley
31199	Shield—Dial lamp shield
3682	Shield—Tube shield
31364	Socket—Dial lamp socket
31365	Socket—Insulated socket for electric tuning indicator lamp
13871	Socket—Magic eye socket
31251	Socket—Octal base tube socket
14278	Socket—Phonograph input socket
12493	Socket—Speaker cable socket
31418	Spring—Coil tension spring for variable condenser or pointer drive cord
32498	Switch—Push button selector switch (S4, S5, S37, S38, S39, S40, S41, S42, S43, S36, S35, S34, S33, S32, S31, S44, S45)
32669	Switch—Range switch (S1, S2)
14376	Transformer—First i.f. transformer (L10, L11, C5, C6)
14283	Transformer—Second i.f. transformer (L12, L13, C7, C8, C37, R4, R5)
31445	Transformer—Power transformer, 110 volt, 25/60 cycle (T1)
32144	Transformer—Power transformer, 110 volt, 50/60 cycle (T1)
31446	Transformer—Power transformer, 110-125-150-210-240 volts 40/60 cycle (T1)
	SPEAKER ASSEMBLIES (RL-70H-5) MODEL 98K2
13866	Cap—Dust cap for cone center
12012	Coil—Field coil (L16)
11469	Coil—Neutralizing coil (L15)
31275	Cone—Speaker cone and voice coil (114)
31539	Plug—5-contact male plug for speaker
32146	Speaker complete
14534	Transformer—Output transformer (T2)
14357	Washer—Spring washer to hold field coil securely
	SPEAKER ASSEMBLIES (84308-3) MODEL 98T
32689	Coil—Speaker field coil (L16)
32688	Cone—Cone and voice coil mounted and centered on housing (L14)
31539	Plug—5-contact plug or speaker
32687	Speaker—Speaker complete
32690	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
31397	Button—Station selector push button
31456	Covers—8 Protective covers for push button markers
32673	Dial—Station selector glass dial
32674	Escutcheon—Station selector escutcheon — less push buttons
31355	Knob—Range switch knob
31391	Knob—Tone control knob
14359	Knob—Tuning knob
30773	Knob—Volume control knob
31458	Marker—"Dial Tuning" push button marker
31457	Marker—"Record Player" push button marker
31589	Marker—Station markers
30330	Spring for tone control knob
4982	Spring for tuning knob
14270	Spring for volume control or range switch knob

RCA Victor

MODEL K-105

Chassis No. RC-476

Three-Band, AC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 47—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

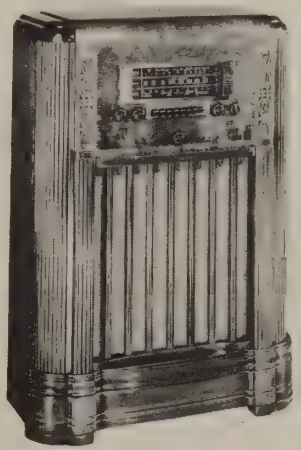
FREQUENCY RANGES

Standard Broadcast	540-1,550 kc
Medium Wave	1.55-4.0 mc
Short Wave	5.8-18.0 mc
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SK7	R-F Amplifier
(2) RCA-6SA7	1st Det., Oscillator
(3) RCA-6SK7	I-F Amplifier
(4) RCA-6H6	2nd Det., A.V.C.
(5) RCA-6SF5	A-F Amplifier
(6) RCA-6SF5	Phase Inverter
(7) RCA-6F6-G	Power Output
(8) RCA-6F6-G	Power Output
(9) RCA-5U4-G	Rectifier
(10) RCA-6U5/6G5	Tuning Indicator

PILOT LAMPS (2) .... Mazda No. 44, 6.3 volts, 0.25 amp.



POWER OUTPUT RATING

Undistorted	10 watts
Maximum	12 watts

LOUDSPEAKER (RL-70K-2)

Type	12-inch electrodynamic
V.C. Impedance	2.2 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 150 watts
Rating B	105-125 volts, 25-60 cycles, 150 watts
Rating C	100-130, 140-160, 195-250 volts, 40-60 cycles, 150 watts

Mechanical Specifications

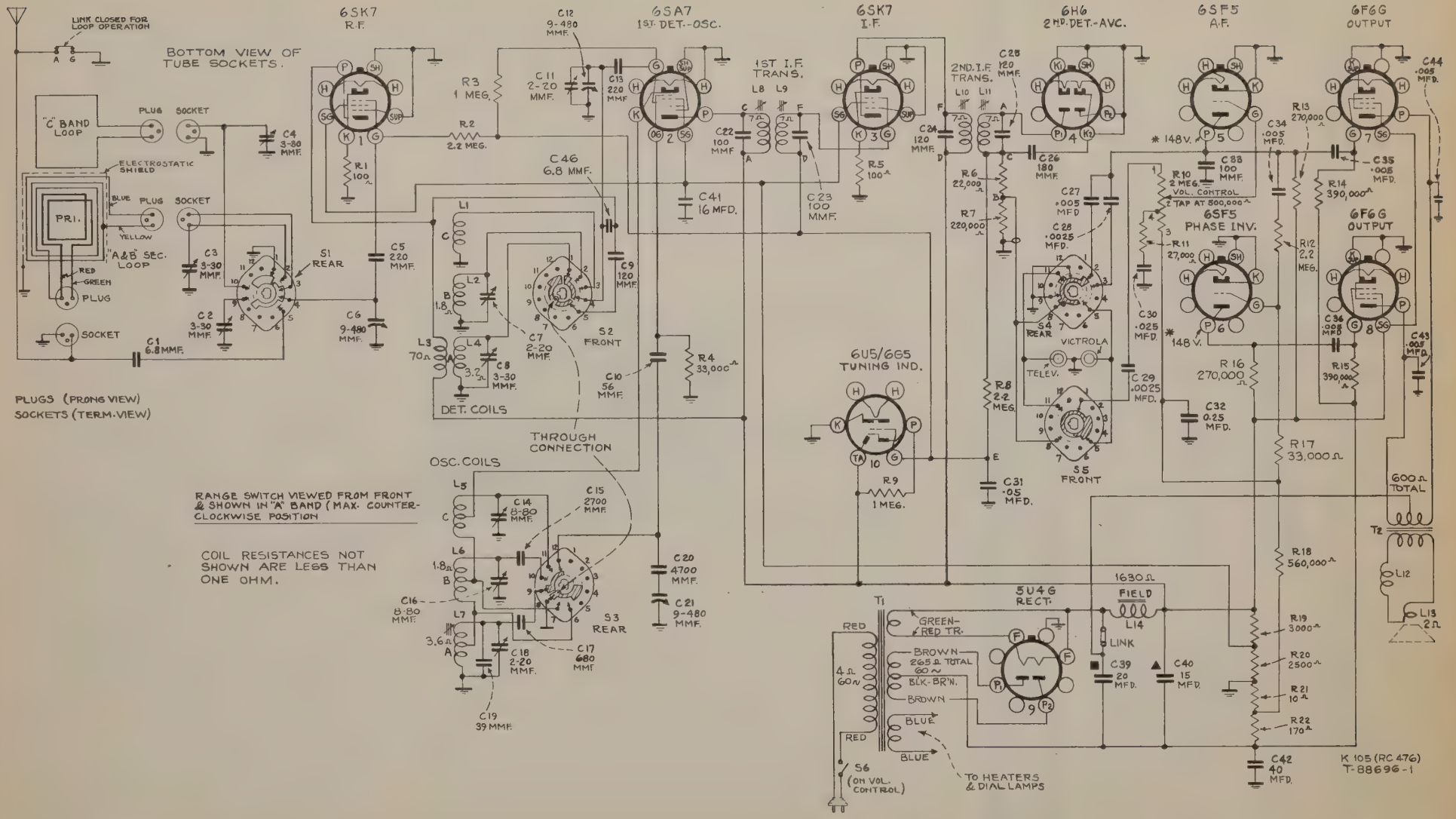
	Height	Width	Depth
Cabinet Dimensions (inches)	43	30½	14 7/16
Chassis Base Dimensions (inches)	3¼	18⅝	8½
Over-all Chassis Height			7¾ inches
Weight			99 lbs. (Shipping), 83 lbs. (Net)
Tuning Drive Ratio			20 to 1

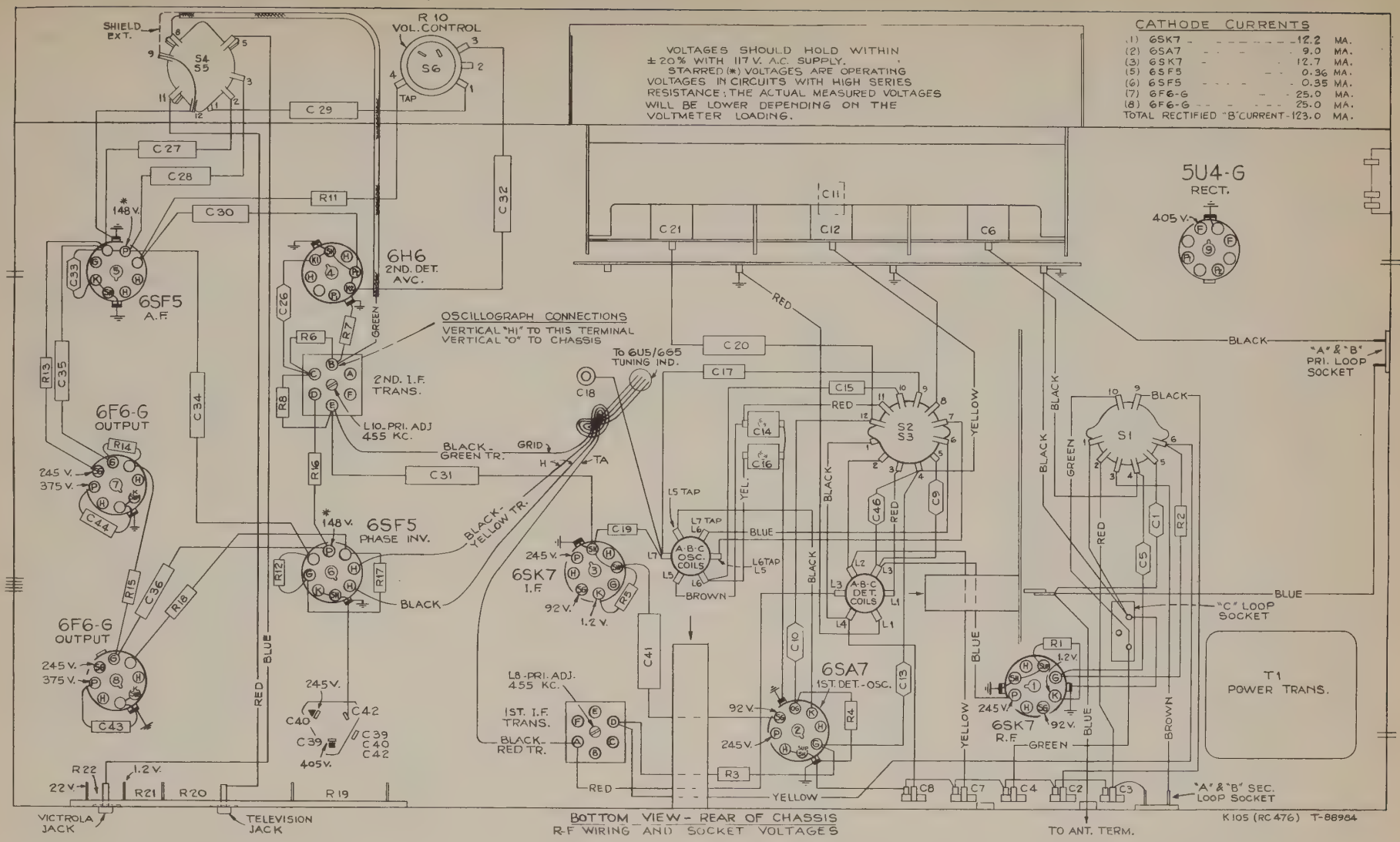
Push Button Adjustment

The push-buttons should be adjusted for eight favorite stations after the receiver is operating, and has had a brief warm-up period.

Any standard broadcast stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-button screws in back of the station-marker recesses.
2. Set Accessory-Tone Knob to "Radio" and turn the range selector to "A."
3. Press in the tuning knob and accurately tune in the first station.
4. With station accurately tuned in, press in the first push-button and tighten the screw.
5. Place the station marker tab in the recess.
6. Proceed in a similar manner to adjust the remainder of the push-buttons.


LINK CLOSED FOR LOOP OPERATION
A G
BOTTOM VIEW OF TUBE SOCKETS.
"C" BAND LOOP
PLUG
SOCKET
ELECTROSTATIC SHIELD
PRI.
BLUE
YELLOW
"A&B" SEC. LOOP
RED
GREEN
PLUG
SOCKET
C1 6.8MMF.
C2 3-30 MMF.
C3 3-30 MMF.
C4 3-30 MMF.
C5 220 MMF.
C6 9-480 MMF.
S1 REAR
6SK7 R.F.
R1 100Ω
R2 2.2 MEG.
R3 1 MEG.
C11 2-20 MMF.
C12 9-480 MMF.
C13 220 MMF.
6SA7 1ST. DET.-OSC.
C46 6.8 MMF.
C41 16 MFD.
L1
L2
L3 70Ω
L4
C7 2-20 MMF.
C8 3-30 MMF.
C9 120 MMF.
S2 FRONT
DET. COILS
C10 56 MMF.
R4 33,000Ω
THROUGH CONNECTION
OSC. COILS
L5
L6
L7
C14 8-80 MMF.
C15 2700 MMF.
C16 8-80 MMF.
C17 680 MMF.
C18 2-20 MMF.
C19 39 MMF.
S3 REAR
C20 4700 MMF.
C21 9-480 MMF.
1ST I.F. TRANS.
L8 L9
C22 100 MMF.
C23 100 MMF.
6SK7 I.F.
R5 100Ω
2ND. I.F. TRANS.
L10 L11
C25 120 MMF.
C24 120 MMF.
6H6 2ND. DET.-AVC.
C26 180 MMF.
R6 22,000Ω
R7 220,000Ω
C27 .005 MFD.
C28 .0025 MFD.
6U5/6G5 TUNING IND.
R8 2.2 MEG.
R9 1 MEG.
C31 .05 MFD.
S4 REAR
VICTROLA
TELEV.
S5 FRONT
C29 .0025 MFD.
6SF5 A.F.
* 148 V.
C33 100 MMF.
R10 2 MEG. VOL. CONTROL
TAP AT 500,000Ω
6SF5 PHASE INV.
R11 27,000Ω
C30 .025 MFD.
C32 0.25 MFD.
R16 270,000Ω
R17 33,000Ω
6F6G OUTPUT
C34 .005 MFD.
R12 2.2 MEG.
C35 .005 MFD.
R13 270,000Ω
R14 390,000Ω
R15 390,000Ω
C43 .005 MFD.
C44 .005 MFD.
600Ω TOTAL
T2
L12
L13 2Ω
R18 560,000Ω
R19 3000Ω
R20 2500Ω
R21 10Ω
R22 170Ω
C42 40 MFD.
5U4G RECT.
T1
RED
GREEN-RED TR.
BROWN
265Ω TOTAL
60~
BLK-BR'N.
BROWN
BLUE
RED
BLUE
4Ω 60~
1630Ω
FIELD
L14
LINK
C39 20 MFD.
C40 15 MFD.
S6 (ON VOL. CONTROL)
TO HEATERS & DIAL LAMPS
PLUGS (PRONG VIEW)
SOCKETS (TERM. VIEW)
RANGE SWITCH VIEWED FROM FRONT & SHOWN IN "A" BAND (MAX. COUNTER-CLOCKWISE POSITION
COIL RESISTANCES NOT SHOWN ARE LESS THAN ONE OHM.
K 105 (RC 476)
T-88696-1



BOTTOM VIEW - REAR OF CHASSIS
R-F WIRING AND SOCKET VOLTAGES

Precautionary Lead Dress:

1. Dress 4,000-mmfd. roll capacitor from the range switch to the gang condenser (C21) away from the chassis.
2. Dress 2,700-mmfd. capacitor connected from the oscillator coil (L6) to the range switch away from the bus wire directly beneath it.
3. Dress leads from phono and television plugs to tone control switch away from the speaker leads, terminal No. 3 (plate) of the output leads and away from the 6H6.
4. Dress red AC leads to power switch away from 6H6 and away from volume control terminals.
5. Leads from power transformer must be dressed close to base away from trimmer bank and oscillator coil.
6. All leads from trimmers should be dressed away from chassis base and range switch.
7. Green, blue, and brown leads from loop terminal boards should be dressed away from chassis base and range switch.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

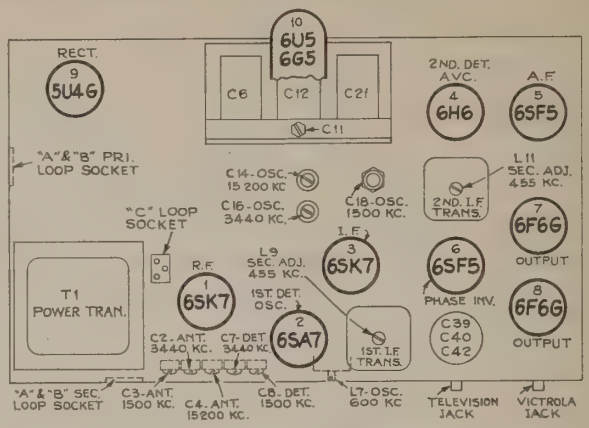
Test-Oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action. For the first six steps in alignment the low side of the test-oscillator should be connected to the receiver chassis. Following step 6, the signal must be radiated (see note under alignment table).

Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during the first six steps of alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical and directly under the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.



Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 I-F grid in series with .01 mfd.	455 kc	"B" band Quiet point between 1.5-2.0 mc	L10 and L11 (2nd I-F trans.)
2	6SA7 det. grid in series with .01 mfd.			L8 and L9 (1st I-F trans.)
3	6SK7 R-F grid in series with 0.1 mfd.	15.2 mc	15.2 mc (192°) "C" band	C14 (osc.)* C11 (det.) Rock Gang
4		3.44 mc	3.44 mc (183°) "B" band	C16 (osc.)** C7 (det.)
5		600 kc	600 kc (38.5°) "A" band	L7 (osc.) Rock gang
6		1,500 kc	1,500 kc (216°) "A" band	C18 (osc.) C8 (det.)
7	Radiate signal (See note)	15.2 mc	15.2 mc "C" band	C4 (ant.)
8		6.1 mc	6.1 mc "C" band	Inductance of "C" band loop†
9		Repeat step 7		
10		3.44 mc	3.44 mc "B" band	C2 (ant.)
11		1,500 kc	1,500 kc "A" band	C3 (ant.)
12		600 kc	600 kc "A" band	L7 (osc.) Rock Gang
13		1,500 kc	1,500 kc "A" band	C18 (osc.) C8 (det.)

Note.—Following step 6, a radiated signal must be used for the remainder of the alignment. One or two turns of wire forming a loop approximately 18 inches in diameter connected across the output of a test-oscillator such as RCA Model 153, or Stock No. 9595 (TMV-97C), etc., will be suitable. For the adjustments using the radiated signal, the chassis must be placed in the cabinet and the receiver loops connected. The radiating loop should be placed near enough to the receiver loop to provide ample signal strength for alignment.

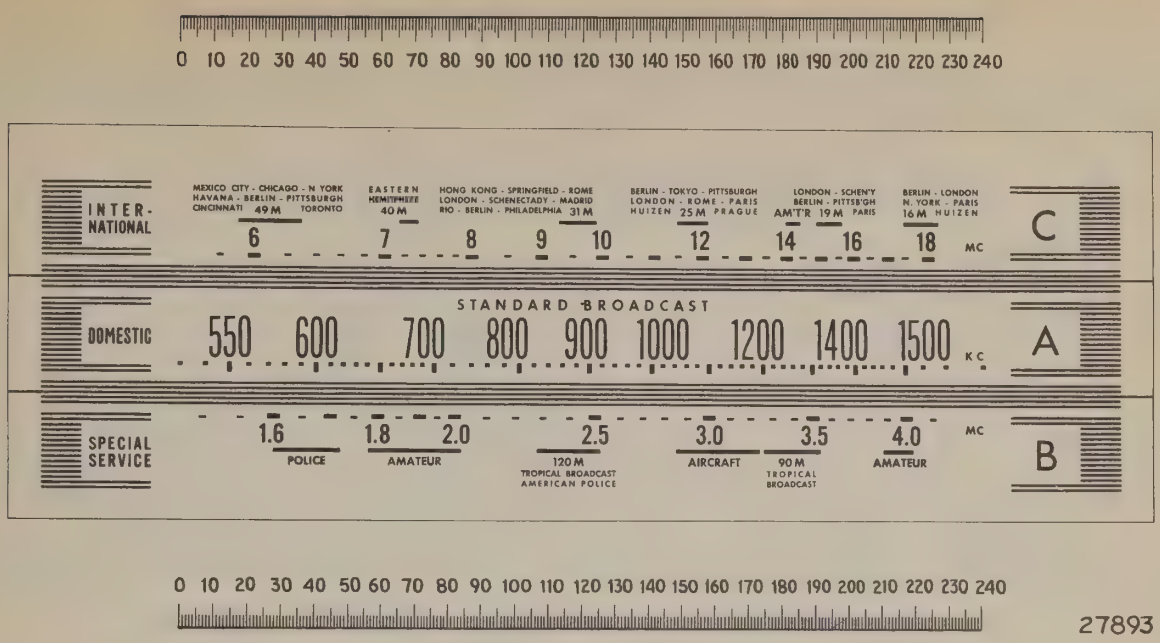
* Use **minimum** capacity peak if two can be obtained. Check to determine that C14 has been adjusted to the correct peak by tuning the receiver to approximately 14.29 mc where a weaker signal should be received.

** Use **minimum** capacity peak if two can be obtained. Check to determine that C16 has been adjusted to the correct peak by tuning the receiver to approximately 2.53 mc where a weaker signal should be received.

† Adjust the inductance of "C" band loop by varying the spacing between the leads of the loop. Moving the leads closer together decreases the inductance and tunes the loop to a higher frequency; moving the leads farther apart increases the inductance and tunes the loop to a lower frequency.

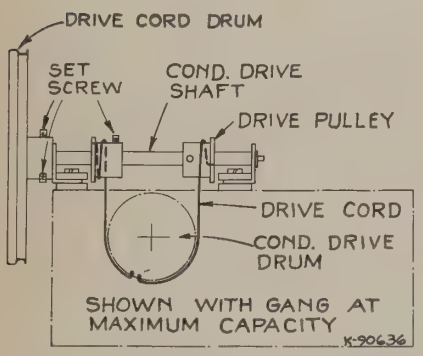
Important.—The oscillator tracks **above** the signal on all bands.

Calibration Scale

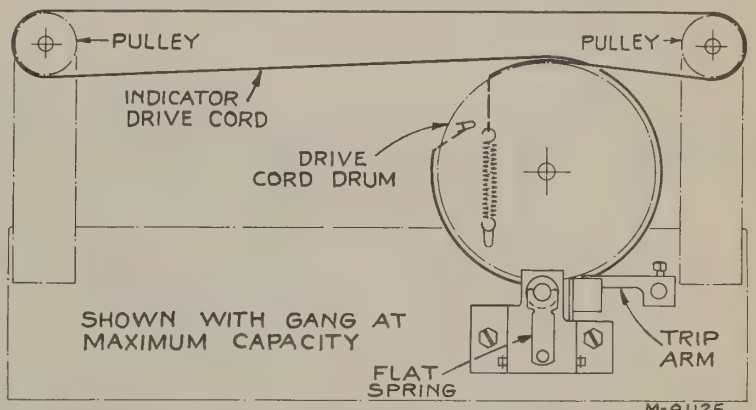

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240
INTER-NATIONAL
MEXICO CITY - CHICAGO - N YORK HAVANA - BERLIN - PITTSBURGH CINCINNATI 49 M TORONTO
EASTERN HEMISPHERE 40 M
HONG KONG - SPRINGFIELD - ROME LONDON - SCHENECTADY - MADRID RIO - BERLIN - PHILADELPHIA 31 M
BERLIN - TOKYO - PITTSBURGH LONDON - ROME - PARIS HUIZEN 25 M PRAGUE
LONDON - SCHEN'Y BERLIN - PITTSB'GH AM'T'R 19 M PARIS
BERLIN - LONDON N. YORK - PARIS 16 M HUIZEN
6 7 8 9 10 12 14 16 18 MC
C
DOMESTIC
STANDARD BROADCAST
550 600 700 800 900 1000 1200 1400 1500 KC
A
SPECIAL SERVICE
1.6 POLICE
1.8 2.0 AMATEUR
2.5 120 M TROPICAL BROADCAST AMERICAN POLICE
3.0 AIRCRAFT
3.5 90 M TROPICAL BROADCAST
4.0 AMATEUR
MC
B
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240
27893

Receiver Dial Scales, and Corresponding 0-240° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 216° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."

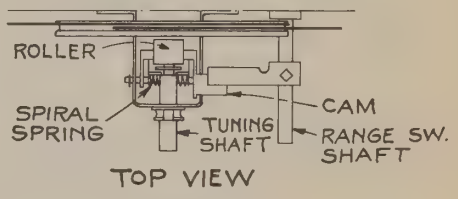


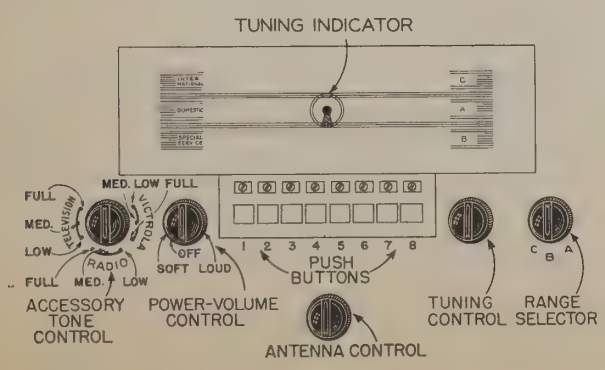
CONDENSER DRIVE CORD ARRANGEMENT

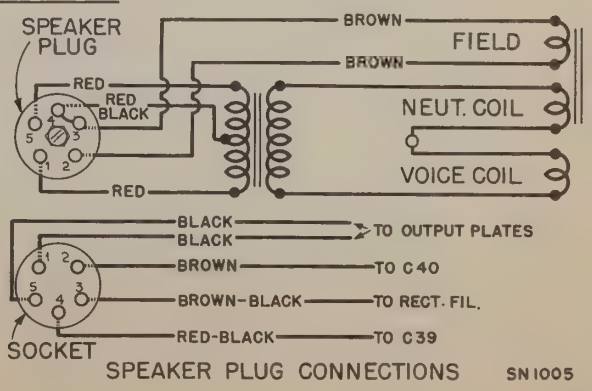


Note: In the Dial Indicator Drive Cord Assembly drawing at the right the mechanism is shown with the **range switch in the "A" band position.** In this position the trip arm on the range shaft must be adjusted so that when the push-buttons are operated, the drive cord drum will turn freely without rubbing or binding against the drive roller.

DIAL INDICATOR DRIVE CORD ASSEMBLY.







SPEAKER PLUG CONNECTIONS SN1005

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-476)
33620	Arm—Push arm and cam assembly on tuning unit —less lock screw
34574	Board—"Antenna-Ground" board
30766	Cap—Rubber cap for Tuning Indicator
12884	Capacitor—Air trimmer—2-20 mmfd. (C18)
34701	Capacitor—Trimmer comprising 4 sections of 3-30 mmfd. and 1 section of 2-20 mmfd. (C2, C3, C4, C7, C8)
34702	Capacitor—Trimmer comprising 2 sections of 8-80 mmfd. (C14, C16)
14079	Capacitor—6.8 mmfd. (C1, C46)
13545	Capacitor—39 mmfd. (C19)
12723	Capacitor—56 mmfd. (C10)
12720	Capacitor—100 mmfd. (C33)
34699	Capacitor—100 mmfd. (C22, C23)
12724	Capacitor—120 mmfd. (C9)
34700	Capacitor—120 mmfd. (C24, C25)
13003	Capacitor—180 mmfd. (C26)
12694	Capacitor—220 mmfd. (C5, C13)
31552	Capacitor—680 mmfd. (C17)
30057	Capacitor—2,700 mmfd. (C15)
31399	Capacitor—4,700 mmfd. (C20)
34459	Capacitor—.0025 mfd. (C28, C29)
33584	Capacitor—.005 mfd. (C27, C34, C35, C36, C43, C44)
4870	Capacitor—.025 mfd. (C30)
32787	Capacitor—.05 mfd. (C31)
12484	Capacitor—0.25 mfd. (C32)
31323	Capacitor—16 mfd. (C41)
34533	Capacitor—Electrolytic comprising 1 section of 20 mfd., 1 section of 15 mfd. and 1 section of 40 mfd.
34579	Coil—Oscillator coil
34697	Coil—R.F. coil
32634	Cord—Tuning condenser drum drive cord
32713	Core—Core and stud for oscillator coil
34578	Control—Tone control
34695	Control—Volume control and power switch
33627	Drum—Condenser drive drum
33174	Drum—Tuning condenser drive drum
34532	Gear—Gear sector for range switch
11891	Lamp—Dial lamp
33427	Pulley—Drive cord pulley and mounting bracket
35005	Pulley—Drive pulley less bronze drive cord
34537	Resistor—Voltage divider comprising 1 section of 3,000 ohms, 1 section of 2,500 ohms, 1 section of 10 ohms, and 1 section of 170 ohms (R19, R20, R21, R22)
14439	Resistor—100 ohms, ½ watt (R1, R5)
13998	Resistor—22,000 ohms, ½ watt (R6)
12738	Resistor—27,000 ohms, ½ watt (R11)
12454	Resistor—33,000 ohms, ½ watt (R4, R17)
12264	Resistor—220,000 ohms, ½ watt (R7)
12199	Resistor—270,000 ohms, ½ watt (R13, R16)
13479	Resistor—390,000 ohms, ½ watt (R14, R15)
12486	Resistor—560,000 ohms, ½ watt (R18)
12013	Resistor—1 megohm, 1/10 watt (R9)
13730	Resistor—1 megohm, ½ watt (R3)
12679	Resistor—2.2 megohm, ½ watt (R2, R8, R12)
30340	Retainer—Retainer for shaft of tuning shaft cam and arm
33419	Roller—Friction roller for tuning knob shaft
31613	Screw—No. 8-32 milled head set screw for drum, Stock No. 33174
14350	Screw—No. 8-32 square head set screw for gear, Stock No. 34532
33621	Screw—Push arm lock screw
34703	Shaft—Range switch shaft
33422	Shaft—Tuning shaft less friction roller
31364	Socket—Dial lamp socket
13871	Socket—Tuning Indicator socket
14278	Socket—Phonograph input socket
34575	Socket—2-terminal loop socket
31319	Socket—Tube socket
33175	Spring—Drive cord spring
33622	Spring—Push arm return spring
34694	Spring—Tuning shaft cam spiral spring
33421	Spring—Tuning shaft flat spring
34696	Switch—Range switch
34698	Transformer—First i-f transformer
34524	Transformer—Second i-f transformer
34693	Transformer—Power transformer—110 volts, 25 cycles
34539	Transformer—Power transformer—105-125 volts, 50-60 cycles
	SPEAKER ASSEMBLIES (RL-70K-5)
31825	Cap—Dust cap
35170	Coil—Field coil
11469	Coil—Neutralizing coil
34773	Cone—Cone complete with voice coil
34728	Diffuser
31539	Plug—5-prong male plug for speaker
14534	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
35046	Bearing—Antenna loop bearing comprising spindle and pivot
33474	Button—Push button
34285	Clip—Tuning Indicator clip
35045	Dowel—1 set of dowel pins for loop antenna
33439	Escutcheon—Station selector escutcheon less push buttons
34706	Frame—Dial frame complete with brackets less dial, pointer, pointer guide rods and Tuning Indicator clip
34583	Frame—Frame only for "C" band loop
34383	Indicator—Station selector indicator
33434	Knob—Tuning, tone control, range switch or power switch and volume control knob
35132	Loop—"A" and "B" band antenna loop
33842	Marker—Push button station markers
34990	Plug—2-prong male plug for "C" band loop
32641	Plug—3-prong male plug for "A" and "B" band loop
34708	Scale—Glass dial scale
35049	Shaft—Flexible shaft assembly to turn loop
34491	Shaft—Pointer carriage guide shaft
14270	Spring—Retaining spring for knob, Stock No. 33434

RCA Victor

MODEL 6QU

CHASSIS No. RC-414

Five-Tube, Three-Band, A-C, Superheterodyne Victrola

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast (A)	540-1,720 kc (555-174 m)
Medium Wave (B)	2.3-7.0 mc (130-42.8 m)
Short Wave (C)	7.0-22 mc (42.8-13.6 m)
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SA7..... First Detector-Oscillator
(2) RCA-6K7..... I-F Amplifier
(3) RCA-6SQ7..... Second Det., A.V.C., and A-F Amplifier
(4) RCA-6F6-G..... Power Output
(5) RCA-5Y3-G..... Rectifier
(6) RCA-6U5/6G5..... Tuning Indicator

PILOT LAMP (1).....
Mazda No. 44, 6.3 volts, 0.25 amp.

POWER OUTPUT-RATING

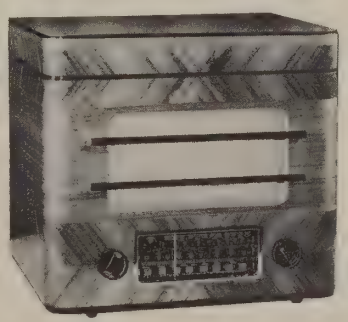
Undistorted..... 1.5 watts
Maximum..... 3.3 watts

LOUDSPEAKER (RL-79-2)

Type..... 6-inch electrodynamic
V.C. Impedance..... 3.4 ohms at 400 cycles

CRYSTAL PICKUP

Impedance..... 100,000 ohms at 1,000 cycles
Average Output.. 1½ volts at 1,000 cycles with 250,000 ohms load



POWER SUPPLY RATINGS

Rating A5.. 105-125 volts, 60 cycles, 100 watts
Rating A6.. 105-125 volts, 50 cycles, 100 watts
Rating C6..... 105-125; 200-250 volts, 60 cycles, 100 watts
Rating C5..... 105-125; 200-250 volts, 50 cycles, 100 watts

Cabinet Dimensions (inches).	Height	Width	Depth
	14¾	16 3/16	13 5/16
Chassis Base Dimensions (inches).	2¾	12	5¼

Over-all Chassis Height..... 7¼ inches
Weight..... 31 lbs. (Net)
Tuning Drive Ratio..... 11 to 1

PHONOGRAPH MECHANISM

Type..... Manual; 10-inch or 12-inch records
Motor... Self-starting, constant speed induction

General Description

Model 6QU is a three-band, table-type, superheterodyne Victrola housed in a wood cabinet. The phonograph mechanism is of the manual type, and will play either 10-inch or 12-inch records.

Victrolas having "C5" or "C6" power rating may be made to operate on either 110 or 220 volts, conversion from one voltage to the other being made by means of a switch at the back of the chassis.

Features of design include: New type, single-ended tubes (6SA7 and 6SQ7); magnetite-core I-F transformers; magnetite-core oscillator coil on "A" band; automatic volume control; straight-line, edge-lighted dial; continuously variable tone control; supply-voltage change-over switch (on "C5" and "C6" rating Victrolas).

Miscellaneous Service Data

Phonograph Mechanism:

The phonograph motor is a self-starting, constant-speed induction type. It should be lubricated every six months by applying a few drops of light machine oil to the spindle bearing and oil hole.

The motor spindle is tapered, and a conical rubber piece fits snugly on the spindle. The hole in the turntable bushing is tapered to fit the rubber. This provides an excellent self-centering floating mounting.

A metal washer is placed on the spindle under the rubber piece. The washer has ears on the under side which fit over a pin that projects through the spindle.

The motor switch is automatic for both starting and stopping, and when properly adjusted, will turn the motor on as the pickup is moved from the pickup rest toward the turntable. The switch should be adjusted so that it will snap into the "off" position when the pickup needle is 1¾ inches from the center line of the spindle shaft. The motor may be shut off at any time by placing the pickup on the pickup rest.

Crystal Pickup:

The crystal pickup is sealed in a metal case; if failure occurs, do not attempt to repair the unit, but install a new crystal unit.

Precautionary Lead Dress:

1. Lead from 2nd I-F transformer to volume control should be kept close to the chassis and dressed against front apron.
2. C-10 should be dressed away from the antenna section of the variable condenser (C-1).

First Edition

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Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 135° mark on the drum scale must be vertical, and directly under the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

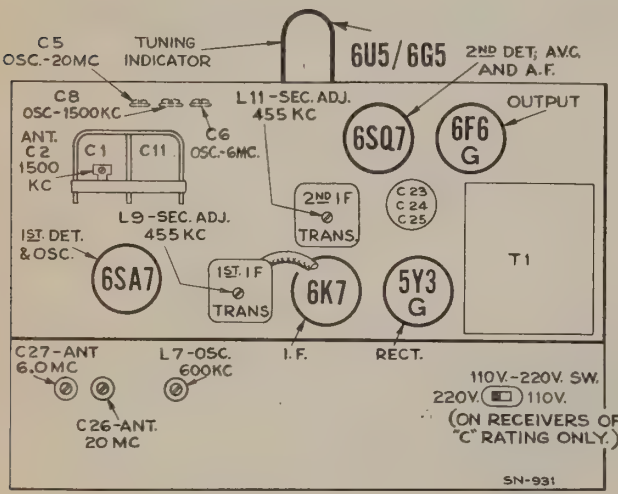
Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

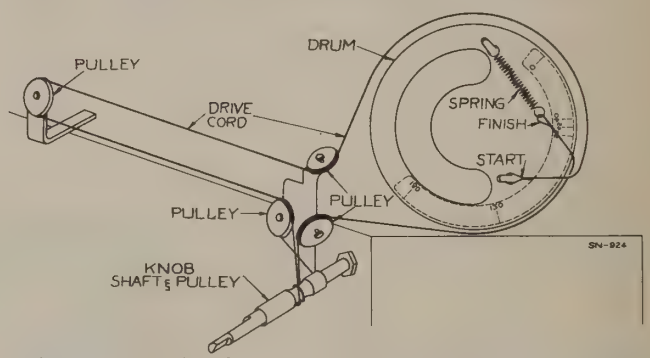
For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	"A" Band quiet point between 550-750 kc	L10 and L11 (2nd I.F. trans.)
2	Tuning condenser stator (osc.) in series with .01 mfd. **	455 kc		L8 and L9 (1st I.F. trans.)
3	Antenna lead in series with 200 mmfd.	600 kc	600 kc (33°) "A" Band	L7†
4		1,500 kc	1,500 kc (152.4°) "A" Band	C2 (ant.) C8 (osc.)
5	Repeat steps 3 and 4			
6	Antenna lead in series with 400 ohms	20 mc	20 mc (155.4°) "C" Band	C5 (osc.) * C26 (ant.)
7		6 mc	6 mc (149°) "B" Band	C6 (osc.) * C27 (ant.)
8	Antenna lead in series with 200 mmf.	1,500 kc	1,500 kc (152.4°) "A" Band	C8 (osc.)

* Use minimum capacity peak if two peaks can be obtained.
† Rock gang condenser slightly while adjusting L7.
** Make test-oscillator connection to lug on tuning condenser stator (oscillator section) in series with .01 mfd. condenser.
Note.—Oscillator tracks 455 kc above signal on all bands.

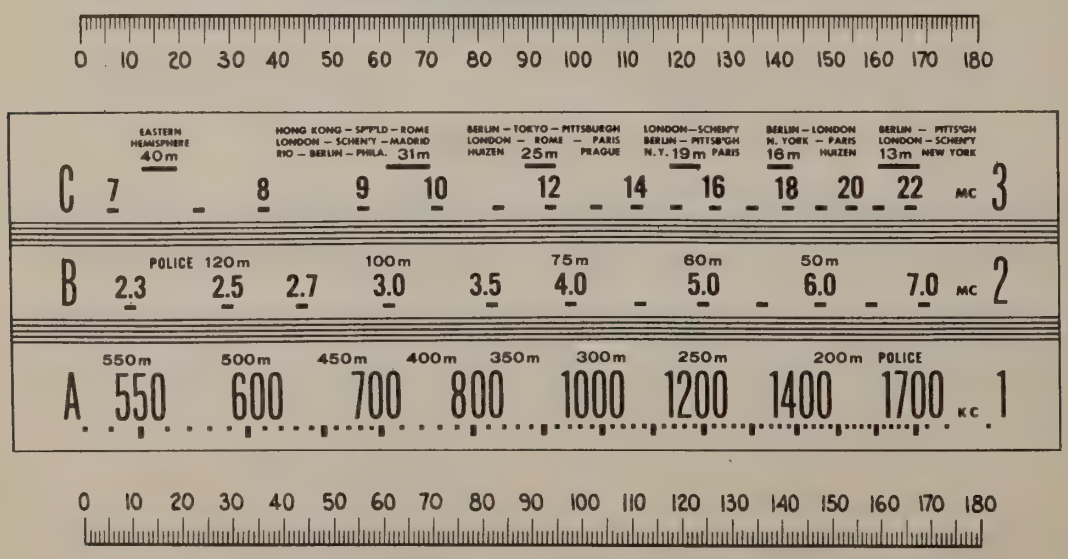


Tube and Trimmer Locations



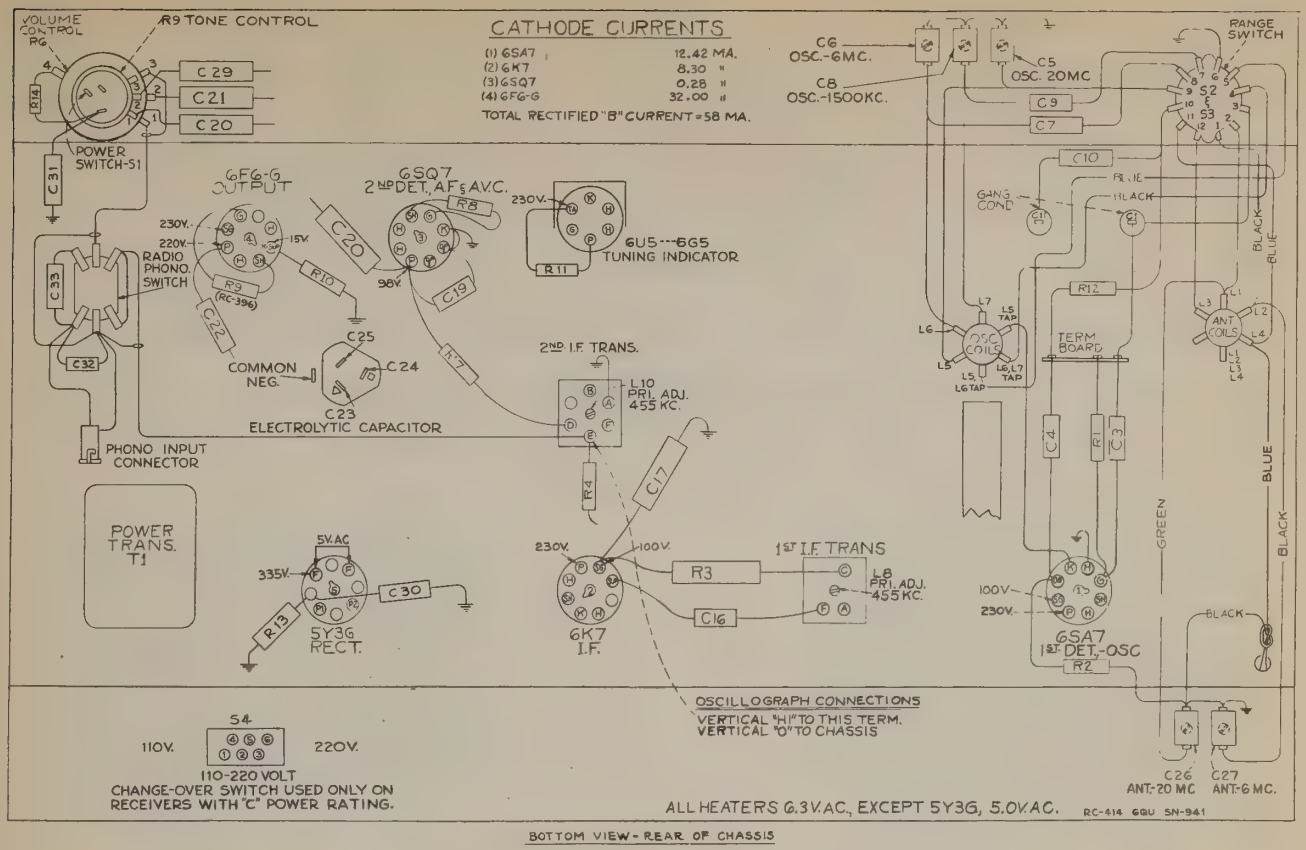
Arrangement of Drive Cord for Tuning Condenser and Dial Indicator. Drum Shown with Gang at Maximum Capacity

Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
EASTERN HEMISPHERE 40m
HONG KONG – SP'FLD – ROME LONDON – SCHEN'Y – MADRID RIO – BERLIN – PHILA. 31m
BERLIN – TOKYO – PITTSBURGH LONDON – ROME – PARIS HURZEN 25m PRAGUE
LONDON – SCHEN'Y BERLIN – PITTSB'GH N.Y. 19m PARIS
BERLIN – LONDON N. YORK – PARIS 16m HURZEN
BERLIN – PITTS'GH LONDON – SCHEN'Y 13m NEW YORK
C 7 8 9 10 12 14 16 18 20 22 MC 3
POLICE 120m 100m 75m 60m 50m
B 2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 7.0 MC 2
550m 500m 450m 400m 350m 300m 250m 200m POLICE
A 550 600 700 800 1000 1200 1400 1700 KC 1
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 33° on the calibration scale corresponds to approximately 7.9 mc on "C" band, and 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."

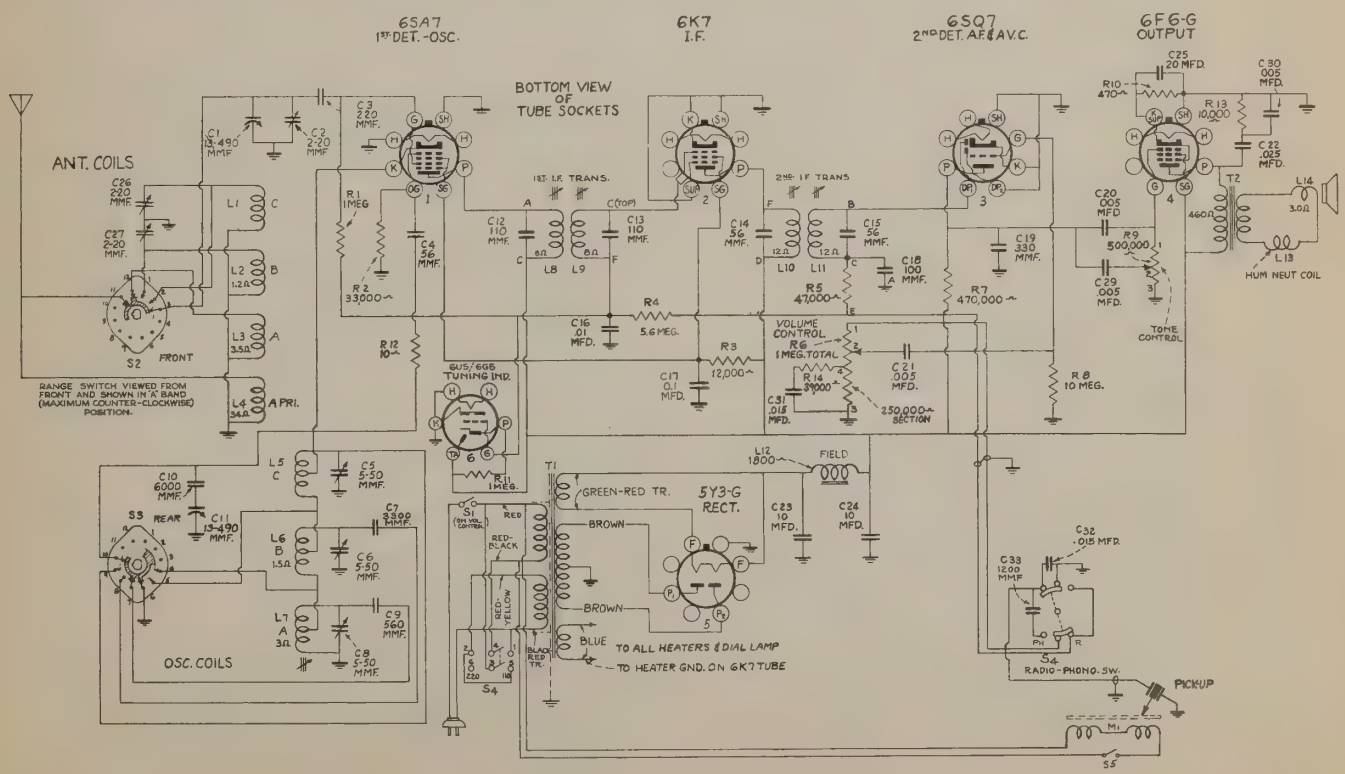


BOTTOM VIEW - REAR OF CHASSIS

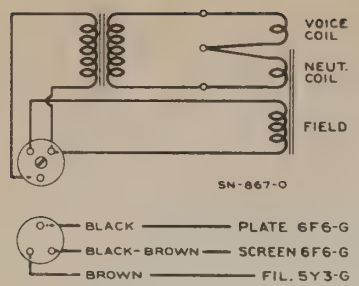
R-F Wiring Diagram and Socket Voltages

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ± 20% with 117-volt a-c supply.

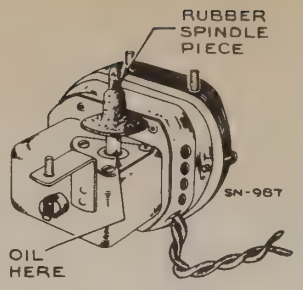
***NOTE: Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.**



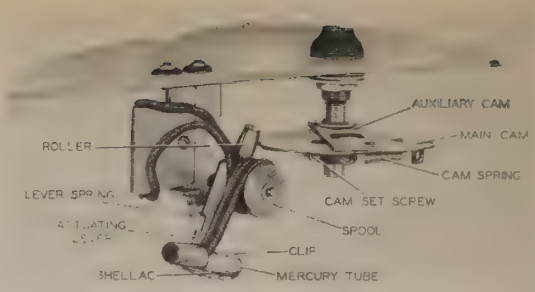
Schematic Circuit Diagram



Connections and Colors of Speaker and Cable



Phonograph Motor



Switch Mechanism
(Shown with pickup in rest position)

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-414)
33528	Bracket—Drive bracket and 1 pulley assembled
32951	Bracket—Drive bracket and 3 pulleys assembled
32136	Cable—Phono. input shielded lead and socket
12581	Cap—Top shield cap for i-f transformer
32830	Capacitor—2-gang trimmer, 2-20 mmfd. each section (C26, C27)
32829	Capacitor—3-gang trimmer, 5-60 mmfd. each section (C5, C6, C8)
12723	Capacitor—56 mmfd. (C4)
30949	Capacitor—56 mmfd. (C14, C15)
14262	Capacitor—109 mmfd. (C12, C13)
32238	Capacitor—110 mmfd. (C18)
30232	Capacitor—220 mmfd. (C3)
12952	Capacitor—330 mmfd. (C19)
13894	Capacitor—390 mmfd. (C33)
12537	Capacitor—560 mmfd. (C9)
13054	Capacitor—1,200 mmfd. (C33)
31403	Capacitor—3,300 mmfd. (C7)
31405	Capacitor—6,000 mmfd. (C10)
33584	Capacitor—.005 mfd. (C30)
4838	Capacitor—.005 mfd. (C20, C21, C29)
14393	Capacitor—.01 mfd. (C16)
11315	Capacitor—.015 mfd. (C31, C32)
4870	Capacitor—.025 mfd. (C22)
4839	Capacitor—0.1 mfd. (C17)
32240	Capacitor—Electrolytic, 2 sections 10 mfd., 400 V., and one section 20 mfd., 25 V. (C23, C24, C25)
32821	Coil—Antenna coil (L1, L2, L3, L4)
32824	Coil—Oscillator coil (L5, L6, L7)
32817	Condenser—2-gang variable tuning (C1, C2, C11)
33533	Control—Volume control, tone control, and power switch
32713	Core—Adjustable core and stud for oscillator coil
32835	Drum—Drive cord drum with set screw
11891	Lamp—Dial lamp—Mazda No. 44
30868	Plug—2-contact female motor cable plug
5040	Plug—Female plug for speaker cable
13988	Resistor—10 ohms, ½ watt (R12)
30681	Resistor—470 ohms, 1 watt (R10)
3078	Resistor—10,000 ohms, ½ watt (R13)
31389	Resistor—Voltage divider, 12,000 ohms, 3½ watts (R3)
13998	Resistor—22,000 ohms, ½ watt (R15)
12454	Resistor—33,000 ohms, ½ watt (R2)
12266	Resistor—39,000 ohms, ½ watt (R14)
5132	Resistor—47,000 ohms, 1/10 watt (R5)
12285	Resistor—470,000 ohms, ½ watt (R7)
13730	Resistor—1 meg., ½ watt
11668	Resistor—5.6 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R8)
14343	Retainer—Retaining ring to hold tuning knob shaft
32848	Screw—No. 8-32 square head set screw for drum
32932	Shaft—Tuning knob shaft
31365	Socket—Dial lamp socket (insulated)
32950	Socket—Magic Eye socket and bracket
31251	Socket—Octal base tube socket
31418	Spring—Drive cord tension spring
33113	Switch—Radio-Record switch
32929	Switch—Range switch
32827	Switch—Voltage change switch
14376	Transformer—First i-f transformer (L8, L9, C12, C13)
32825	Transformer—Second i-f transformer (L10, L11, C14, C15, C18, R5)
32910	Transformer—Power transformer, 105-120 volt, 25-60 cycle
32911	Transformer—Power transformer 105-125 volts, 50-60 cycle
32852	Transformer—Power transformer 105-120 and 210-240 volts, 50-60 cycles

STOCK No.	DESCRIPTION
	AUTOMATIC SWITCH ASSEMBLIES
32863	Cam—Cam assembly comprising main and auxiliary cams, hub and set screws
32864	Lever—Actuating lever with roller and mercury tube clip
14195	Screw—No. 10-32 x 5/16 cone pointed set screw for cam hub
32869	Screw—No. 10-32 x 5/16 set screw for cam hub (Pkg. of 10)
32868	Spring—Actuating lever tension spring (Pkg. of 10)
32867	Spring—Cam tension spring—Pkg. of 10
32865	Support—Switch support and terminal board
32866	Switch—Mercury tube with leads (S2)
31608	Washer—"C" washer for actuating lever shaft
	MOTOR ASSEMBLIES
32650	Field—Motor field coils and laminations, 110 volts, 50 cycle
32336	Field—Motor field coils and laminations, 110 volts, 60 cycle
33220	Motor—105-125 volts, 50 cycles—less mounting plate (M1)
33219	Motor—105-125 volts, 60 cycles—less mounting plate (M1)
33361	Shaft—Turntable spindle shaft and gear—50 cycle
33360	Shaft—Turntable spindle shaft and gear—60 cycle
	PICKUP AND ARM ASSEMBLIES
33125	Arm—Pickup arm complete—less crystal cartridge
33126	Base—Pickup arm base and pivot shaft
33122	Crystal—Pickup crystal cartridge and needle screw
33123	Damper—Viscoloid damper for pickup armature
33529	Screw—Pickup needle screw—Pkg. of 5
	SPEAKER ASSEMBLIES (RL—79—2)
32907	Cap—Speaker cone center dust cap
32903	Coil—Speaker field coil (L12)
32906	Coil—Speaker hum neutralizing coil (L13)
5118	Plug—3 prong male for speaker
32933	Speaker—Complete
32905	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33531	Cup—Needle cup
31464	Damper—Turntable damper and drive sleeve
32837	Dial—Dial scale
33415	Escutcheon—Dial escutcheon
13085	Hinge—Cabinet lid hinge
31802	Knob—Radio-Record switch knob
32937	Knob—Range switch knob
33029	Knob—Tone control and switch knob
32935	Knob—Tuning knob
32936	Knob—Volume control knob
33530	Mounting—Pickup arm rubber mounting, washer, and nut
30870	Plug—2 prong male for motor leads
32610	Rest—Rubber rest for pickup
4982	Spring—Retaining spring for tuning knob
30330	Spring—Retaining spring for tone control knob
14270	Spring—Retaining spring for volume control, range switch, or radio-record switch knob
31164	Support—Cabinet lid support
33113	Switch—Radio-Record switch
33532	Turntable—10 in.

RCA Victor MODELS 8Q2, 8QU5C and 8QU5M

Chassis No. RC-443 RC-443-B RC-443-B

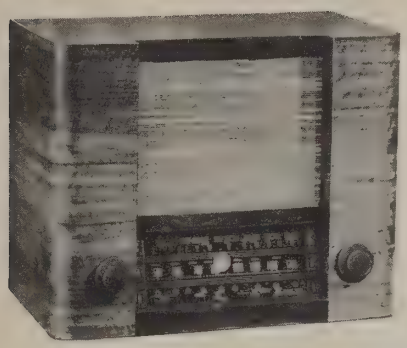
Eight Tubes, Three Bands

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

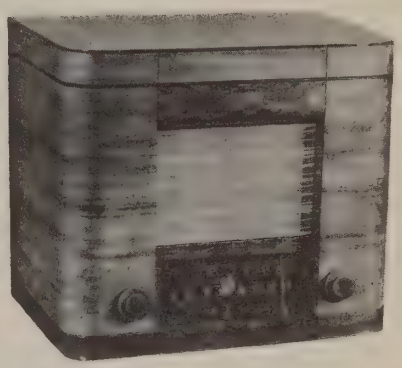
A Service of the Radio Corporation of America



Left—Model 8Q2

Right—Model 8QU5

(8QU5C has crystal pickup; 8QU5M has magnetic pickup)



Electrical Specifications

FREQUENCY RANGES

Standard Broadcast ("A" Band)	540-1,720 kc (555-174 m)
Medium Wave ("B" Band)	2.3-7.0 mc (130-42.8 m)
Short Wave ("C" Band)	7.0-22 mc (42.8-13.6 m)
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SK7	R-F Amplifier
(2) RCA-6SA7	1st Detector-Oscillator
(3) RCA-6B8	I-F Amplifier, 2nd Det., A.V.C.
(4) RCA-6SC7	A-F Amplifier, Phase Inverter
(5) RCA-6F6-G	Power Output
(6) RCA-6F6-G	Power Output
(7) RCA-5Y3-G	Rectifier
(8) RCA-6U5/6G5	Tuning Indicator

PILOT LAMPS (3) ... 2-Mazda No. 44, 6.3 volts, 0.25 amp.; 1-Mazda No. 47, 6.3 volts, 0.15 amp.

POWER OUTPUT RATING

Undistorted	4.5 watts
Maximum	5.5 watts

LOUDSPEAKER (RL-63J-6)

Type	8-inch electrodynamic
V.C Impedance	2.2 ohms at 400 c.p.s.
PHONOGRAPH MOTOR	self-starting, constant-speed, induction type

CRYSTAL PICKUP

Impedance	100,000 ohms at 1,000 c.p.s.
Average Output	1.5 volts at 1,000 c.p.s. across 500,000 ohms load

MAGNETIC PICKUP

Impedance	96 ohms at 1,000 c.p.s.
Average Output	0.14 volts at 400 c.p.s. across open circuit

POWER SUPPLY RATINGS

8Q2:

Rating A	105-125 volts, 50-60 cycles, 75 watts
Rating B	105-125 volts, 25-60 cycles, 75 watts
Rating C	100-130, 140-160, 195-250 volts, 40-60 cycles, 75 watts

8QU5C and 8QU5M

Rating A5	105-125 volts, 50 cycles, 105 watts
Rating A6	105-125 volts, 60 cycles, 105 watts
Rating C5	105-125; 200-250 volts, 50 cycles, 105 watts
Rating C6	105-125; 200-250 volts, 60 cycles, 105 watts

Mechanical Specifications

	8Q2	8QU5C and 8QU5M
Height (inches)	14 1/4	17 3/16
Width (inches)	18	20 1/16
Depth (inches)	10 15/32	14 7/32
Weight (Net lbs.)	29	46
Chassis Base Dimensions (inches)	2 7/8 x 15 5/8 x 6 1/2	
Over-all Chassis Height (inches)	8 1/8	
Tuning Drive Ratio	10 to 1; 50 to 1	

First Edition

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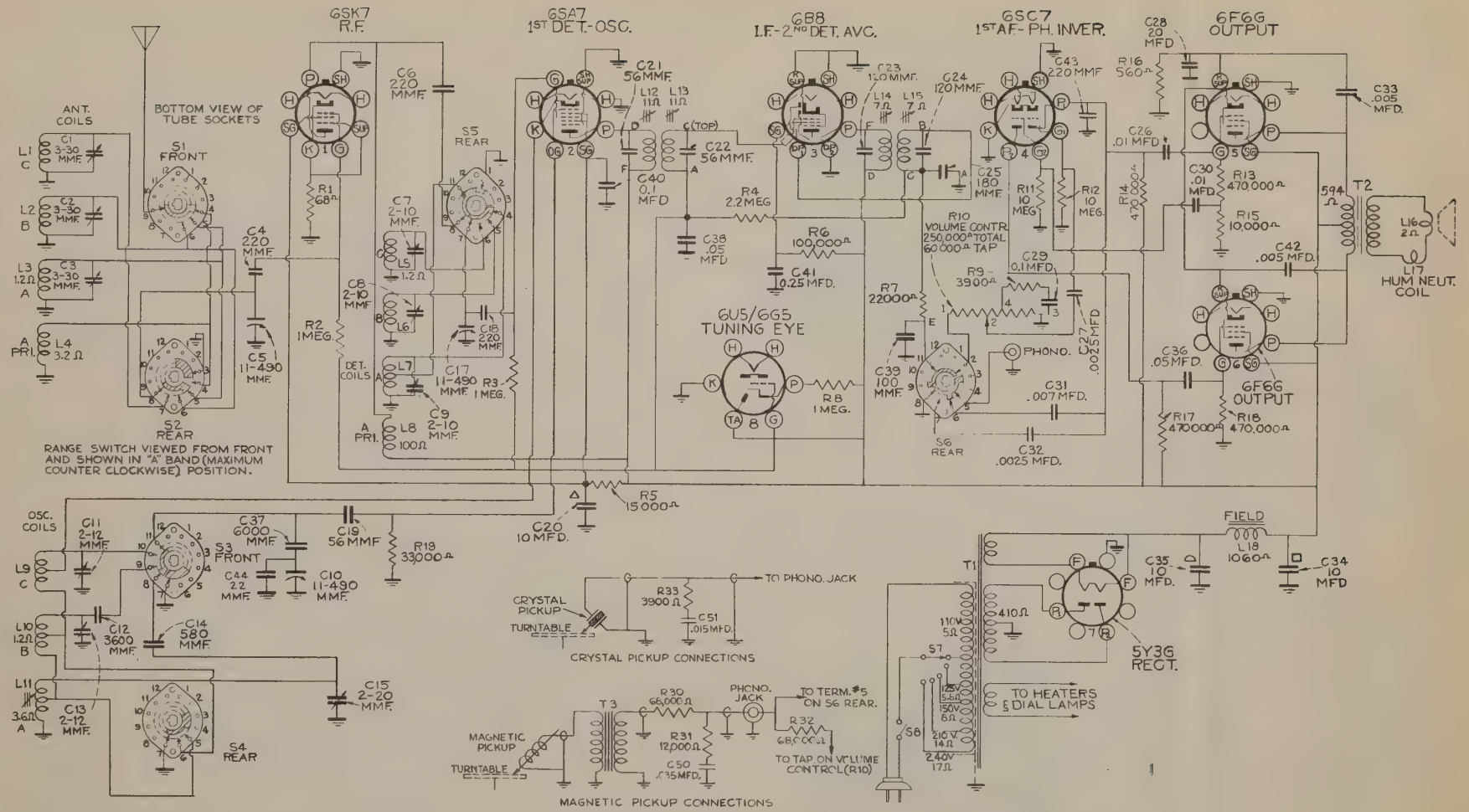
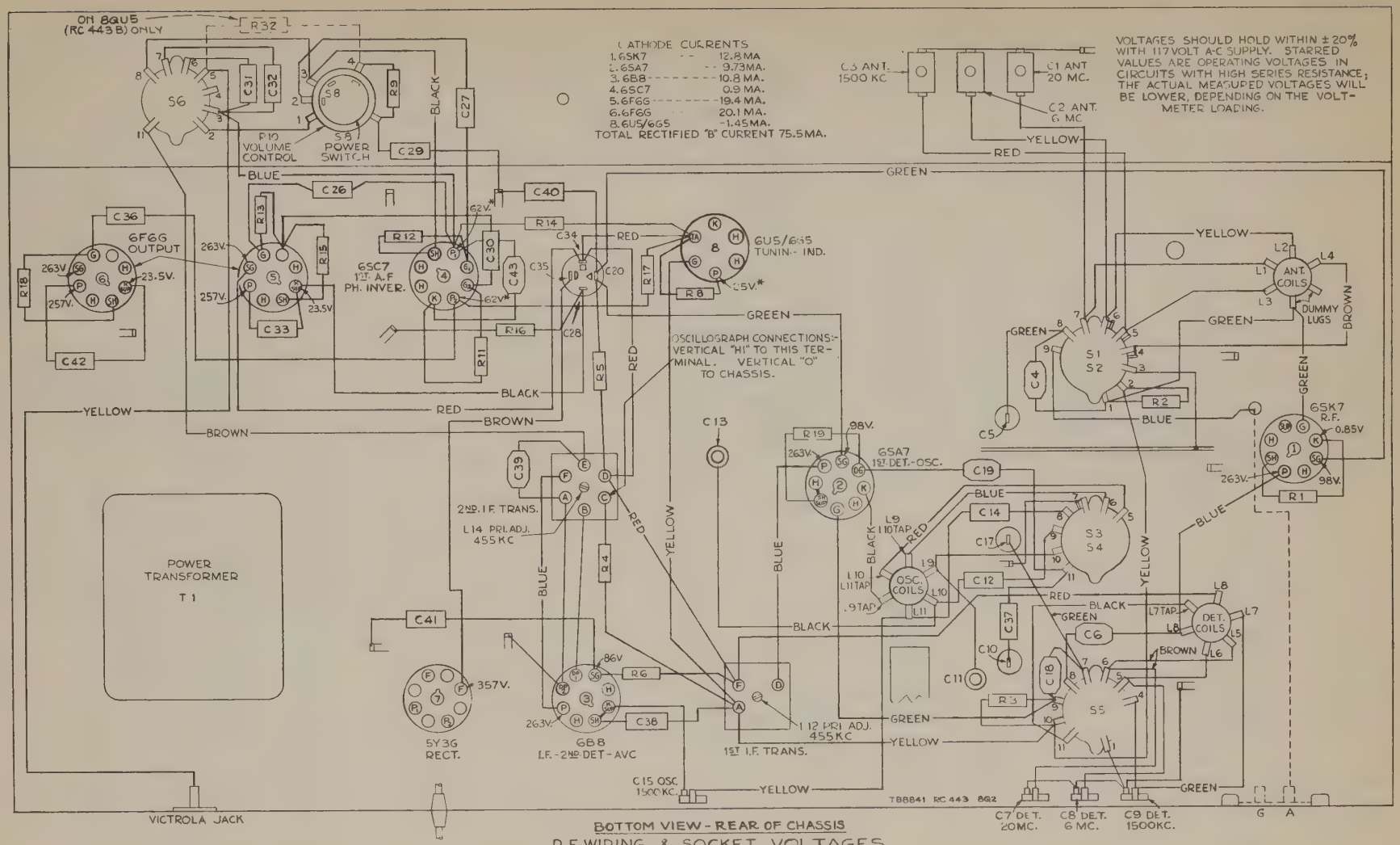
Printed in U. S. A.



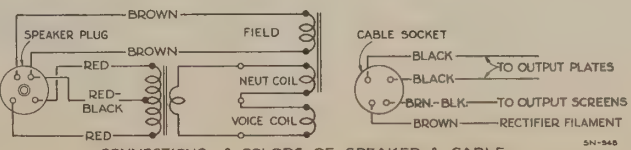
Precautionary Lead Dress:

1. Leads from L5 and L6 to terminals 5 and 6 on S5, and the leads from these terminals to C7 and C8, should be dressed as far as possible from parts at ground potential.
2. The lead from the detector gang (C17) to terminal 7 on S5, and the lead from the 6SA7 grid to terminal 9 on S5 should be kept away from ground and from parts in the oscillator grid circuit, such as C37, C19, S3 and S4.
3. The lead from terminal E on the second I-F transformer to terminal 11 on S6 should be dressed against the sub-base.
4. The lead from the plate of the 6SK7 (R-F) to L8 should be dressed away from parts at ground potential.
5. The lead from the grid of the 6SK7 (R-F) to terminal 1 on S1 should be kept as far as possible from the antenna lead running to terminal 9 on S1.

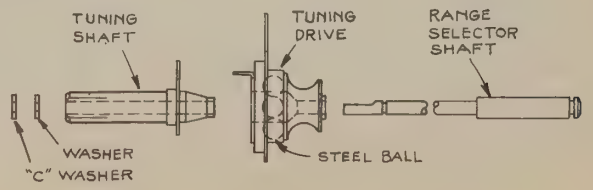


BOTTOM VIEW - REAR OF CHASSIS

R.F. WIRING & SOCKET VOLTAGES



CONNECTIONS & COLORS OF SPEAKER & CABLE



PLANETARY TUNING DRIVE ASS'Y

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

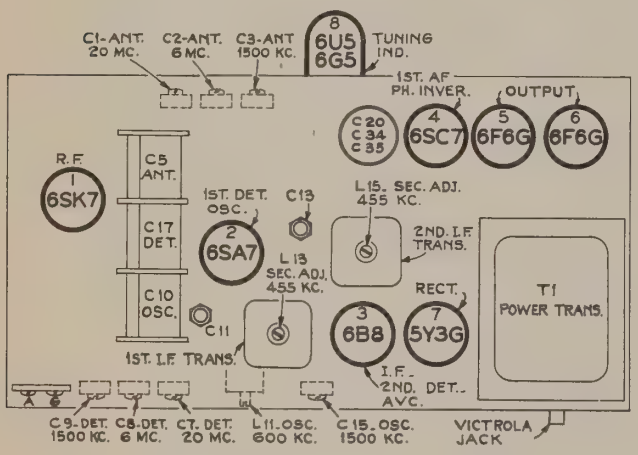
Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 180° mark on the calibration scale when the plates are fully meshed.

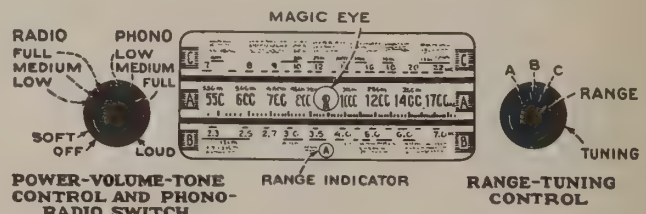
Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

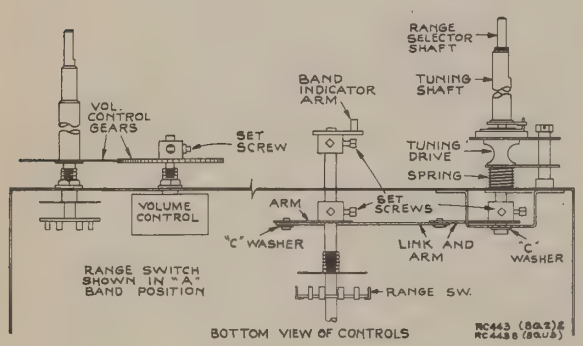
For additional details, refer to booklet "RCA Victor Receiver Alignment."

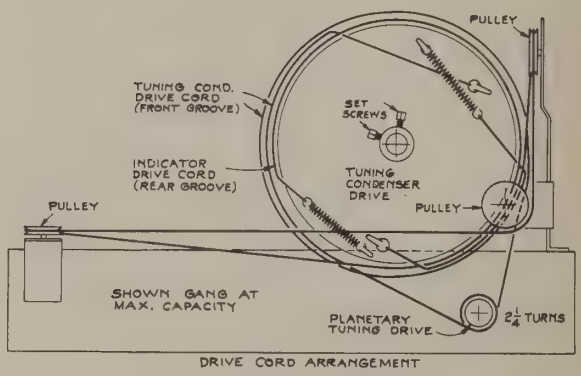
Steps	Connect the high side of test-osc. to	Tune test-osc. to	Turn radio dial to	Adjust the following for maximum peak output
1	6B8-I-F grid in series with .01 mfd.	455 kc	Quiet point on "C" Band	L14 and L15 (2nd I-F Trans.)
2	Stator of middle section of gang [C17] in series with .01 mfd.			L12 and L13 (1st I-F Trans.)
3	Ant. terminal in series with 200 mmfd.	600 kc	600 kc (148°) "A" Band	L11 (osc.) Rock gang
4		1,500 kc	1,500 kc (28°) "A" Band	C15 (osc.)* C9 (det.)† C3 (ant.)
5	Ant. terminal in series with 300 ohms	6.1 mc	6.1 mc (29°) "B" Band	C13 (osc.)* C8 (det.)† C2 (ant.)
6		20 mc	20 mc (23°) "C" Band	C11 (osc.)* C7 (det.)† C2 (ant.)

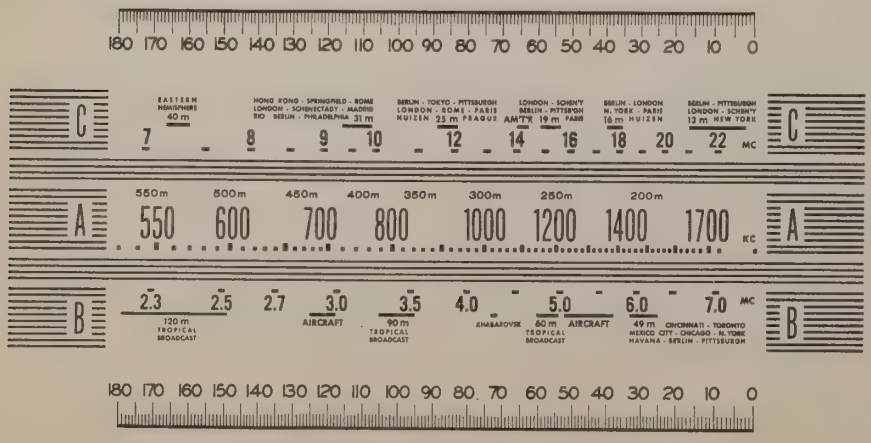
* Use minimum capacity peak if two peaks can be obtained.
† Use maximum capacity peak if two peaks can be obtained.
NOTE: Oscillator tracks 455 kc above signal on all bands.











Calibration Scale

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 38° on the calibration scale corresponds to approximately 7.9 mc on "C" band, and 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."

The 8QU5M is equipped with a magnetic pickup, and the 8QU5C with a crystal pickup. The output of the crystal pickup is fed directly into the Victrola jack at the rear of the chassis. On instruments using a magnetic pickup, a transformer and compensating circuit are used between the pickup and the Victrola jack (see schematic diagram). The transformer has two jacks, the larger one (primary) for input from the pickup and the smaller one (secondary) for output to the compensating circuit. The components of the compensating circuit are mounted externally to the chassis on a terminal board in the rear of the cabinet.

The phonograph motor is a self-starting, constant-speed induction type. It should be lubricated every six months by applying a few drops of light machine oil to the spindle bearing and oil hole.

The motor spindle is tapered, and a conical rubber piece fits snugly on the spindle. The hole in the turntable bushing is tapered to fit the rubber. This provides an excellent self-centering floating mounting.

A metal washer is placed on the spindle under the rubber piece. The washer has ears on the under side which fit over a pin that projects through the spindle.

The motor switch is automatic for both starting and stopping, and when properly adjusted, will turn the motor on as the pickup is moved from the pickup rest toward the turntable. The switch should be adjusted so that it will snap into the "off" position when the pickup needle is 1¾ inches from the center line of the spindle shaft. The motor may be shut off at any time by placing the pickup on the pickup rest.

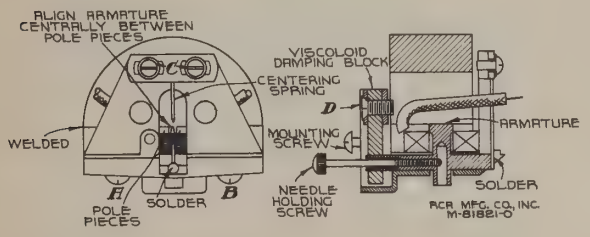
Crystal Pickup:

The crystal pickup is sealed in a metal case; if failure occurs, do not attempt to repair the unit, but install a new crystal unit.

Magnetic Pickup:

The magnetic pickup used is of an improved design. The horseshoe magnet is rigidly welded to the pole pieces and is irremovable. There is a centering spring attached to the armature to maintain proper adjustment and to provide a limiting effect on the movement of the armature. Service operations which may be necessary on the pickup are as follows:

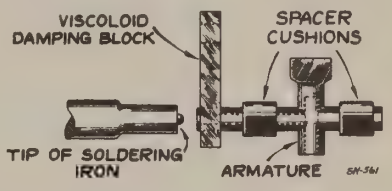
Centering Armature.—Refer to the figure showing the pickup inner structure. The armature is shown in its proper relation to the magnet pole pieces, i. e., exactly centered. Whenever this centering adjustment has been disturbed it will be necessary to remove the pickup mechanism from the tone arm for re-adjustment. Unsolder the two leads from the lugs on the terminal board at the rear of the pickup.



Insert a small rod or nail into the armature needle hole and tighten the needle holding screw to hold the rod securely. If the armature clamping screws A and B have not been disturbed, screws C should be loosened which will permit the armature to be moved from side to side, the rod acting as a lever to perform this operation. The proper adjustment is obtained when the armature is brought to the mid position between the pole pieces. Screws C should then be tightened. The armature position should then be central between the pole pieces and at right angles to them. Check to make sure that the armature is not touching the coil. The air gap between the pole pieces and the armature should be kept free from dust, filings, and other foreign material which would obstruct the movement of the pickup armature.

Replacing Coil.—Whenever there is defective operation due to an open or shorted pickup coil, this coil should be replaced. Remove the pickup mechanism and terminal board. Remove screws A and B and the magnet assembly. Remove the bakelite coil support (with coil attached) and insert the new coil support assembly in its place, after which replace the magnet assembly and center the armature as described above, then re-assemble the remainder of the unit. Only rosin core solder should be used for soldering the coil leads and pickup leads to the pickup terminal board. This same type of solder should be used when necessary for soldering the centering spring to the armature.

Magnetizing.—Loss of magnetization will not usually occur when the pickup has received normal care because the magnet and pole pieces are one unit and the magnetic circuit remains practically closed at all times. When the pickup has been mishandled, subjected to a strong a-c field, jolted, or dropped, there may be an appreciable loss of magnetic strength, in which case it will be necessary to re-magnetize the entire structure. To do this, it will be necessary to first remove the pickup mechanism from the tone arm, and then remove the magnet assembly. Place the magnet assembly on the poles of a standard pickup magnetizer such as the RCA Stock No. 9549 Pickup Magnetizer and charge the magnet in accordance with the instructions accompanying the magnetizer. It is preferable to check the polarity of the pickup magnet and to remagnetize it so that the same polarity is maintained.



Damping Block.—The viscoloid damping block which is attached to the front end of the armature shank serves to reduce undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block, the pickup mechanism should be removed from the tone arm. Remove screw D and the damping block from the pickup assembly. Make sure that the shaft of the armature which contacts the viscoloid is clean. Then insert the new damping block so that it occupies the same position as that of the original block, and is in correct vertical alignment with the armature. The hole in the block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the damping block properly aligned on the armature, screw D with its washer should then be replaced. Heat should be applied to the armature (viscoloid side) so that the damping block will fuse at the point of contact and become rigidly attached to the armature. A special-tip soldering iron, constructed as shown, will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block, causing a small bulge on both sides.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-443 and RC-443B)		31405	Capacitor—6,000 mmfd. (C37)	
34133	Arm—Band indicator arm—located on range switch shaft		5107	Capacitor—.0025 mfd. (C27, C32)	
34502	Arm—Operating arm on range switch shaft		4838	Capacitor—.005 mfd. (C33, C42)	
10194	Ball—Steel ball		13033	Capacitor—.007 mfd. (C31)	
31767	Board—Antenna ground terminal board		4858	Capacitor—.01 mfd. (C26, C30)	
34131	Bracket—Drive cord pulley and brackets		32787	Capacitor—.05 mfd. (C36, C38)	
33819	Capacitor—Trimmer capacitor — 3 sections of 2-10 mmfd. each		32786	Capacitor—0.1 mfd. (C29, C40)	
12714	Capacitor—Air trimmer capacitor—2-12 mmfd. (C11, C13)		12484	Capacitor—0.25 mfd. (C41)	
33817	Capacitor—Trimmer capacitor—1 section of 2-20 mmfd. (C15)		33014	Capacitor—Comprising 3 sections of 10 mfd., 450 volts, and 1 section of 20 mfd., 25 volts (C20, C28, C34, C35)	
33820	Capacitor—Trimmer capacitor — 3 sections of 3-30 mmfd. each (C1, C2, C3)		33762	Coil—Antenna coil—A-B-C bands (L1, L2, L3, L4)	
31868	Capacitor—22 mmfd. (C44)		33763	Coil—Detector coil—A-B-C bands (L5, L6, L7, L8)	
12723	Capacitor—56 mmfd. (C19)		32824	Coil—Oscillator coil—A-B-C bands (L9, L10, L11)	
30949	Capacitor—56 mmfd. (C21, C22)		33756	Condenser—Variable tuning condenser (C5, C10, C17)	
12720	Capacitor—100 mmfd. (C39)		33814	Control—Volume control and switch (R10, S8)	
12404	Capacitor—120 mmfd. (C23, C24)		32635	Cord—Indicator drive cord	
14712	Capacitor—180 mmfd. (C25)		32634	Cord—Tuning condenser drive cord	
12694	Capacitor—220 mmfd. (C4, C6, C18, C43)		32713	Core—Adjustable core and stud for oscillator coils	
33235	Capacitor—580 mmfd. (C14)		33770	Drive—Planetary tuning drive—less shafts and balls, and shaft retainer	
12811	Capacitor—3,600 mmfd. (C12)				

Replacement Parts (Continued)

STOCK No.	DESCRIPTION
33773	Drum—Variable tuning condenser drum and hub
33185	Gear—Shaft and gear for volume control
34132	Gear—Shaft and gear for tone control
11891	Lamp—Pilot lamp
33767	Link—Operating link and arm on range switch knob shaft
5040	Plug—4-contact female plug for speaker cable
34130	Pulley—Drive pulley and brackets
14281	Resistor—68 ohms, ½ watt (R1)
17214	Resistor—560 ohms, 2 watt (R16)
12955	Resistor—3,900 ohms, ½ watt (R9)
14559	Resistor—10,000 ohms, ½ watt (R15)
33489	Resistor—15,000 ohms, 2½ watt (R5)
14284	Resistor—22,000 ohms, 1/10 watt (R7)
12454	Resistor—33,000 ohms, ½ watt (R19)
3252	Resistor—100,000 ohms, ½ watt (R6)
12285	Resistor—470,000 ohms, ½ watt (R13, R14, R17, R18)
13730	Resistor—1 megohm, ½ watt (R2, R3, R8)
12679	Resistor—2.2 megohms, ½ watt (R4)
13601	Resistor—10 megohms, ½ watt (R11, R12)
14350	Screw—No. 8-32 x 11/32 square head set screw for gear and drum
34134	Shaft—Range switch shaft
34135	Shaft—Tuning knob shaft
33829	Socket—Magic Eye bracket and socket
14278	Socket—Phonograph input socket
31364	Socket—Pilot lamp socket
31251	Socket—Tube socket
13638	Spring—Indicator drive cord spring
33769	Spring—Planetary tuning drive spring
31418	Spring—Tuning condenser drive cord spring
33757	Switch—Range switch (S1, S2, S3, S4, S5)
34602	Switch—Tone control (S6)
32263	Transformer—1st I.F. transformer (L12, L13, C21, C22)
14308	Transformer—2nd I.F. transformer (L14, L15, C23, C24, C25, R7)
31734	Transformer—Power transformer—105/125 volts, 25/60 cycle (T1)
31733	Transformer—Power transformer—105/125 volts, 50/60 cycle (T1)
31735	Transformer — Power transformer — 105/130, 140/160, 200/250 volts, 50/60 cycle (T1, S7)
	MOTOR ASSEMBLIES (Model 8QU5-C) (Model 8QU5-M)
32650	Field—Motor field coils and laminations, 110 volts, 50 cycle
32336	Field—Motor field coils and laminations, 110 volts, 60 cycle
33220	Motor—105-125 volts, 50 cycles—less mounting plate
33219	Motor—105-125 volts, 60 cycles—less mounting plate
33361	Shaft—Turntable spindle shaft and gear — 50 cycle
33360	Shaft—Turntable spindle shaft and gear — 60 cycle
	PICKUP AND ARM ASSEMBLIES (Model 8QU5-M)
34304	Arm—Pickup arm—less unit cable and pivot arm
34303	Arm—Pivot arm and set screw
14291	Armature—Pickup armature
14930	Coil—Pickup coil
14292	Damper—Pickup armature damper
32228	Pickup Unit—Magnet, coil, needle screw, and armature, assembled
34300	Screw—No. 6-32 x ¼ headless set screw for pick-up pivot arm
3811	Screw—Needle screw
	PICKUP AND ARM ASSEMBLIES (Model 8QU5-C)
34305	Arm—Pickup arm—less crystal, cable, and pivot arm
34306	Arm—Pickup pivot arm with set screw
34550	Bushing—Rubber bushing for pickup pivot arm
34307	Crystal—Pickup crystal cartridge and needle screw
33529	Screw—Needle screw
34300	Screw—No. 6-32 x ¼ headless set screw for pick-up pivot arm

STOCK No.	DESCRIPTION
	AUTOMATIC SWITCH ASSEMBLIES (Model 8QU5-C) (Model 8QU5-M)
34315	Base—Pickup arm base for crystal pickup — Model 8QU5-C
34312	Base—Pickup arm base for magnetic pickup—Model 8QU5-M
32865	Bracket—Switch bracket and terminal board
34308	Cam—Switch cam assembly with spring
32864	Lever—Switch actuating lever, roller, and clip
34309	Mounting—Pickup arm base mounting (rubber grommet, washers, and nut)
34311	Ring—Retaining ring for pickup arm pivot shaft
14195	Screw—No. 10-32 x 5/16 set screw for switch cam hub
34314	Shaft—Pickup arm pivot shaft—for crystal pick-up—Model 8QU5-C
34313	Shaft—Pickup arm pivot shaft — for magnetic pickup—Model 8QU5-M
34310	Spool—Insulating spool for switch leads
32868	Spring—Switch lever spring
32867	Spring—Tension spring for switch cam
32866	Switch—Mercury tube and leads
31608	Washer—Retaining washer for switch lever
	SPEAKER ASSEMBLIES (RL-63-J6)
31825	Cap—Dust cap
12079	Coil—Field coil (L18)
11469	Coil—Neutralizing coil (L17)
34274	Cone—Cone, complete with voice coil and dust cap (L16)
5039	Plug—4-prong male for speaker
14534	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
32610	Bumper — Rubber bumper for pickup arm — Models 8QU5-C and 8QU5-M
34308	Cam — Actuating cam for automatic switch — Models 8QU5-C and 8QU5-M
11315	Capacitor—.015 mfd.—Model 8QU5-C (C51)
5196	Capacitor—.035 mfd.—Model 8QU5-M (C50)
33680	Cup—Needle cup—Models 8QU5-C and 8QU5-M
31464	Damper—Turntable rubber drive sleeve and metal damper plate—Models 8QU5-C and 8QU5-M
34142	Dial—Dial glass scale
34140	Frame—Dial frame less pointers, dial glass and guide rods
13085	Hinge—Cabinet lid hinge—Models 8QU5-C and 8QU5-M
11607	Holder—Packaged needle holder—Models 8QU5-C and 8QU5-M
34144	Indicator—Band indicator strip
34141	Indicator—Station selector indicator and carriage
34139	Knob—Range switch knob
34137	Knob—Tone control knob
34136	Knob—Volume control or tuning knob
31048	Plug—2-contact male plug for phono. input cable—Models 8QU5-C and 8QU5-M
12955	Resistor—3,900 ohms, ½ watt—Model 8QU5-C (R33)
30128	Resistor—12,000 ohms, ½ watt—Model 8QU5-M (R31)
13715	Resistor—68,000 ohms, ½ watt—Model 8QU5-M (R30)
34568	Rest—Pickup rest—Models 8QU5-C and 8QU5-M
34143	Rod—Dial pointer slide rod—Models 8QU5-C and 8QU5-M
34491	Rod—Pointer carriage guide rod—Model 8Q2
34316	Screw—Motor mounting screws, washers, and spacers (sufficient for 1 motor) — Models 8QU5-C and 8QU5-M
14195	Screw—No. 10-32 set screw for cam, Stock No. 34308
34145	Slide—Band indicator slide less strip
32867	Spring—Actuating cam spring
4982	Spring—Retaining spring for knob, Stock No. 34136
14270	Spring—Retaining spring for knob, Stock No. 34137
34138	Spring—Retaining spring for knob, Stock No. 34139
31164	Support—Cabinet lid support—Models 8QU5-C and 8QU5-M
14609	Transformer — Phono. input transformer for model with magnetic pickup—Model 8QU5-M
33532	Turntable—10-inch turntable—Models 8QU5-C and 8QU5-M

RCA Victor MODEL U-8 (Chassis No. RC-404A)

Five-Tube, Single-Band, A-C, Superheterodyne Victrola

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 21 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,720 kc
INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-35L6GT ..... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier
Dial Lamp (1) ..... Mazda 51, 7.5 volts, 0.2 amp.

POWER SUPPLY RATINGS

A-5 ..... 105-125 volts, 50 cycles, 40 watts
A-6 ..... 105-125 volts, 60 cycles, 40 watts

POWER OUTPUT (125 volt, 60 cycle supply)

Undistorted ..... .75 watts
Maximum ..... 1.3 watts

LOUDSPEAKER

Type ..... 5-inch Electrodynamic
Voice-Coil Impedance ..... 3.4 ohms at 400 cycles

PHONOGRAPH ..... Synchronous (manual starting)
Records ..... 10-inch and 12-inch, 78 r.p.m.
Pickup ..... Crystal, 100,000 ohms at 1,000 c.p.s.
Average Output of Pickup ..... 1⅓ volts at 1,000 c.p.s. across ½ meg. load
Cabinet Dimensions (inches)..Height 6 9/16, Width 14⅞, Depth 8¾
Weight (net) ..... 11½ pounds

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
12488	Capacitor—250 mmfd.
12952	Capacitor—300 mmfd.
4838	Capacitor—.005 mfd.
4937	Capacitor—.01 mfd.
33736	Coil—Antenna coil
32962	Coil—Oscillator coil
13057	Condenser—60 mmfd.
30433	Condenser—400 mmfd.
30303	Condenser—.0035 mfd.
33584	Condenser—.005 mfd.
4870	Condenser—.025 mfd.
4839	Condenser—0.1 mfd.
12536	Condenser—820 mfd.
32576	Condenser—Electrolytic, one section 20 mfd., one section 12 mfd.
32968	Condenser—2-gang variable tuning
32634	Cord—Drive cord
33289	Dial—Glass dial scale
33297	Drive—Dial drive mechanism—comprising drive drum, cord, shaft, dial color plate, back plate and pulleys assembled
33006	Feet—Rubber feet
33295	Indicator—Dial pointer
32571	Knob—Tan knob (tuning or volume)
11765	Lamp—Dial lamp—Mazda 51
31193	Lead—Antenna lead
33292	Plate—Dial color plate
33294	Pulley—Drive cord pulley
33558	Resistor—86 ohms
13428	Resistor—150 ohms, ½ watt
30538	Resistor—330 ohms, ½ watt
13998	Resistor—22,000 ohms, ½ watt
12266	Resistor—39,000 ohms, ½ watt
12412	Resistor—47,000 ohms, ½ watt
12264	Resistor—220,000 ohms, ½ watt
12285	Resistor—470,000 ohms, ½ watt
12679	Resistor—2.2 meg., ½ watt
13601	Resistor—10 meg., ½ watt
33464	Shaft—Tuning knob shaft and bearing
32969	Socket—Dial lamp socket
32537	Socket—Tube socket
32803	Spring—Dial knob spring
31615	Spring—Drive cord tension spring
33296	Spring—Drive drum retaining spring
32667	Spring—Knob or drive drum retaining spring.
32966	Transformer—First i-f transformer
32967	Transformer—Second i-f transformer
33465	Transformer—Output transformer
33504	Volume control and power switch
	PICKUP AND ARM ASSEMBLIES
33121	Arm—Pickup arm complete—less crystal cartridge
33592	Base—Pickup arm base and pivot arm
33122	Crystal—Pickup crystal cartridge and needle screw
33123	Damper—Viscoloid damper for pickup armature.
33529	Screw—Pickup needle screw

STOCK No.	DESCRIPTION
	MOTOR ASSEMBLIES
31045	Base—Motor support, damper, and bearing cup assembly
31046	Bearing—Rotor bearing
33353	Cap—Turntable spindle cap (rubber)
33357	Coil—Motor field coil—105-120 volts, 25 cycle.
31918	Coil—Motor field coil—105-120 volts, 50 cycle.
31917	Coil—Motor field coil—105-120 volts, 60 cycle
31040	Cushion—One set rubber cushion for turntable mounting
31047	Cushion—Rubber cushion for rotor bearing
33941	Frame—Motor frame and spindle—60 cycle
33641	Lamination—Rotor lamination—60 cycle
33358	Lamination—Stator laminations—25 cycle
33354	Lamination—Stator laminations—less coil 50 cycle
33355	Motor—105-120 volts, 25 cycle
33351	Motor—105-120 volts, 50 cycle
33940	Motor—105-120 volt, 60 cycle
32075	Ring—Lead ring for turntable—25 cycle
33041	Ring—Retaining ring and washer for spindle cap
33356	Rotor—Rotor frame, laminations, and spindle shaft assembled—25 cycle
33352	Rotor—Rotor frame, laminations, and spindle shaft assembled—50 cycle
31036	Rotor—Turntable and rotor lamination for 60 cycle operation
31042	Stator—Stator assembly comprising coils and laminations for 60 cycle operation
32076	Turntable—Finished turntable plate only—25 cycle
31039	Turntable—Finished turntable plate only—50 cycle
4083	Washer—Leather Washer
33348	Washers—Leather and metal washers for stator bearing
14231	Washer—Metal spacing washer
32074	Weight—One upper and one lower weight for stator—25 cycle (2 each required)
	SPEAKER ASSEMBLIES (RL—78—4)
32907	Cap—Cone dust cap
33809	Coil—Speaker field coil
33466	Speaker complete (no output transformer)
	MISCELLANEOUS ASSEMBLIES
33467	Control—Tone control and Radio-Record switch
33289	Dial—Glass dial scale
30863	Knob—Tone control knob
32895	Knob—Tuning or volume control knob
33530	Mounting—Pickup arm rubber cushion, washer and nut
30870	Plug—2-prong plug for motor leads
32610	Rest—Pickup arm rest

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

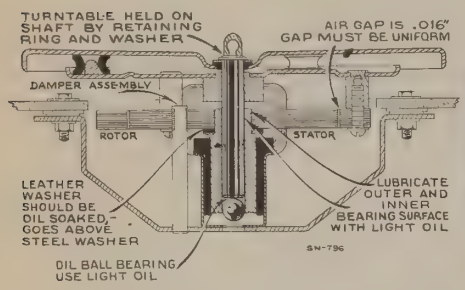
Antenna.—The set is equipped with length of antenna wire. Do not connect the antenna to ground. If an outdoor antenna is used, it should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Tuning condenser stator (osc.) in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna term. of ant. trans. in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C6 (antenna)

Power Supply.—Although this model employs an ac-dc chassis, it is not suitable for use on dc, as this would damage the motor.

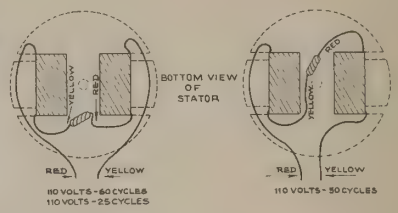
Precautionary Lead Dress

1. Dress 1st I-F plate and grid leads against chassis and away from each other. Dress plate lead from 12SK7 close to chassis.
2. Dress electrolytic capacitor against chassis apron.


TURNTABLE HELD ON SHAFT BY RETAINING RING AND WASHER
AIR GAP IS .016" GAP MUST BE UNIFORM
DAMPER ASSEMBLY
ROTOR
STATOR
LEATHER WASHER SHOULD BE OIL SOAKED,- GOES ABOVE STEEL WASHER
LUBRICATE OUTER AND INNER BEARING SURFACE WITH LIGHT OIL
OIL BALL BEARING USE LIGHT OIL
SM-796

Cross Section of Motor Assembly

Model U-8W
Walnut Finish
Model U-8M
Blonde Mahogany Finish



Motor Coil Assembly and Connections

Phonograph Service Data

The motor is started by turning the radio-phono tone control to either 3rd or 4th position clockwise and giving the turntable a clockwise spin with the hand. Smooth starting and running will be insured by keeping the bearings well cleaned and oiled.

Hum and Vibration.—A small amount of hum when starting, decreasing to a negligible amount when running, is normal. If excessive vibration occurs it may be due to:

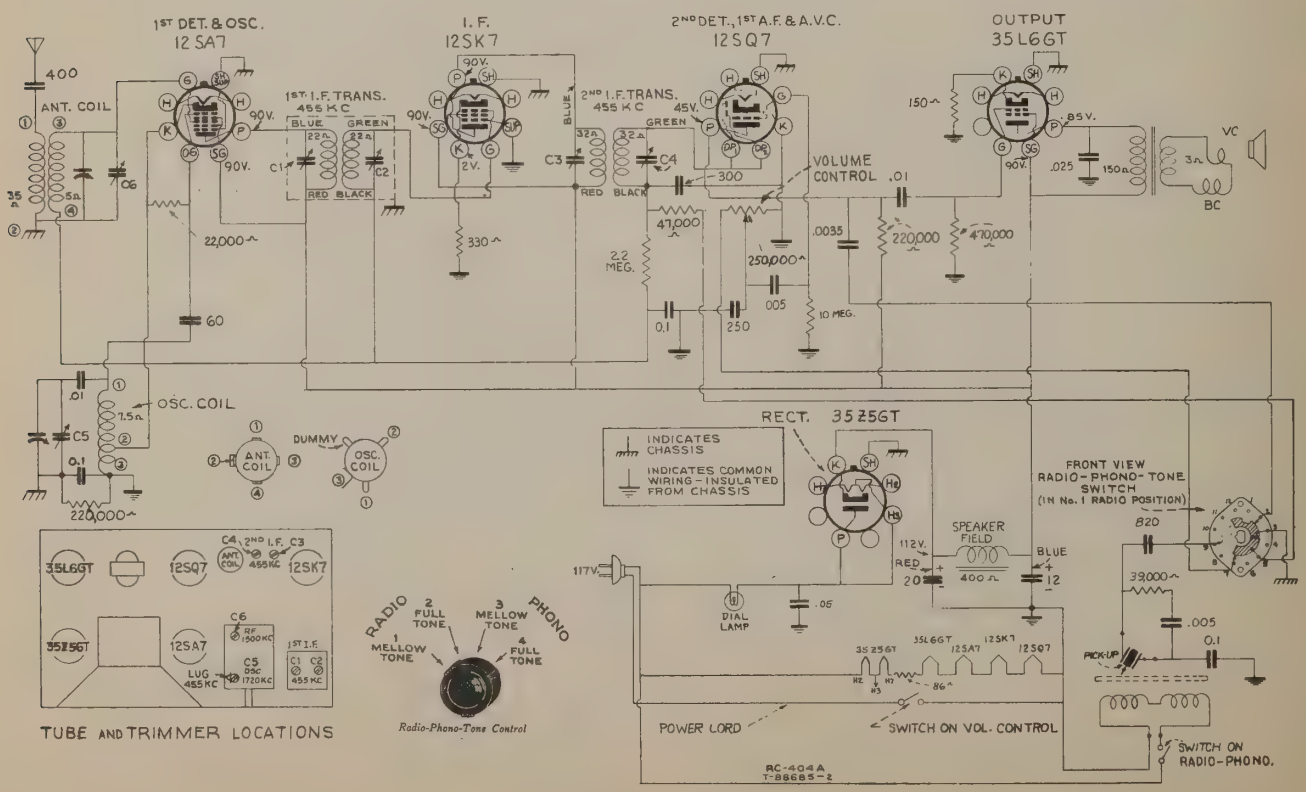
1. Insufficient lubrication, or any failure that will cause binding.
2. Leather washer not oiled. (Check to make certain that the leather washer is above the steel washer.)
3. Motor not properly supported from motor board.
4. Burrs on poles of rotor or stator. Remove with fine emery cloth.

5. The damper spring must fit without binding or chattering in the slot in the stator. The stator must be free to deflect in either direction between the limits of the damper spring. The damper spring must exert approximately equal force in restoring the stator to its mid-position when the stator is deflected manually in each direction.

Removing Rotor.—The rotor and turntable assembly simply rests on the ball bearing at bottom of vertical bearing. Remove by lifting up.

Rotor Adjustment.—Loosen the three screws that hold the rotor to the turntable, insert three 16-mil shims at equal distances around the gap between the rotor and stator, and then carefully tighten the three screws. The top of rotor must be flush with top of stator; add additional steel washers beneath the stator if necessary.

Lubrication.—Oiling points are indicated in the diagram.



Schematic Circuit Diagram

RCA VICTROLA MODEL U-9 (Chassis No. RC-482B)

Five-Tube, Single-Band, A-C, Superheterodyne

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 49—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U.S.A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast and one Police Band ..... 540-1,720 kc
INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7 ..... 1st Detector—Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd Detector, A.V.C., A.F.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Rectifier

PILOT LAMP (1) ..... Mazda No. 51, 7.5 volts, 0.2 amp.

LOUDSPEAKER (84843-1 or RL81-2)

Type ..... 5-inch P M Dynamic
Voice Coil Impedance ..... (84843-1) .... 3.4 ohms at 400 cycles; (RL81-2) .... 4.5 ohms at 400 cycles
PICKUP ..... Crystal
Pickup Impedance ..... 0.1 meg. at 1,000 cycles

PHONO MECHANISM ..... Self-starting motor, Edge-driven turntable, Adjustable Speed

POWER OUTPUT RATING

Undistorted ..... 0.71 watts
Maximum ..... 1.36 watts

POWER SUPPLY RATINGS

A-6 ..... 105-125 volts, 60 cycles
A-5 ..... 105-125 volts, 50 cycles
POWER CONSUMPTION ..... 55 watts

CABINET DIMENSIONS

10-5/16 in. high ..... 17-7/16 in. wide ..... 13⅜ in. deep
Tuning Drive Ratio ..... 12 to 1
Shipping Weight ..... 23½ lbs.
Net Weight ..... 22 lbs.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
30303	Capacitor—.0035 mmfd. (C15)
13057	Capacitor—68 mmfd. (C3)
33584	Capacitor—.005 mfd. (C7)
4937	Capacitor—.01 mfd. (C9)
11315	Capacitor—.015 mfd. (C17)
30938	Capacitor—.025 mfd. (C11)
32787	Capacitor—.05 mfd. (C12)
4839	Capacitor—0.1 mfd. (C5, C8, C10, C18)
34505	Capacitor—0.2 mfd. (C6)
34873	Capacitor—Electrolytic comprising 1 section of 40 mfd. and 1 section of 30 mfd.
34443	Coil—Oscillator coil (L2, L3)
34843	Condenser—Tuning condenser (C20, C21, C22, C23)
34034	Control—Volume control and power switch (R16, S1)
32634	Cord—Drive cord
33453	Drum—Drive cord drum
34841	Frame—Dial and drive frame complete—less indicator drive cord, tuning shaft and drive drum
34842	Indicator—Station selector indicator
11765	Lamp—Dial lamp
35130	Loop—Antenna loop
30868	Plug—2-contact female plug for motor cable
5119	Plug—3-contact female plug for speaker cable
12071	Resistor—120 ohms, ½ watt (R3)
30545	Resistor—180 ohms, ½ watt (R9)
30152	Resistor—1,000 ohms, 1 watt (R11)
13998	Resistor—22,000 ohms, ½ watt (R1)
5132	Resistor—47,000 ohms, 1/10 watt (R15)
12412	Resistor—47,000 ohms, ½ watt (R14)
14560	Resistor—100,000 ohms, ½ watt (R8)
12264	Resistor—220,000 ohms, ½ watt (R7, R13)
12285	Resistor—470,000 ohms, ½ watt (R10)
12679	Resistor—2.2 megohm, ½ watt (R4)
13601	Resistor—10 megohm, ½ watt (R6)
34033	Shaft—Tuning shaft
34449	Socket—Dial lamp socket
32537	Socket—Tube socket
33296	Spring—Retaining spring for drum, Stock No. 33453
34844	Transformer—1st i.f. transformer (L4, L5, C24, C25)
34442	Transformer—2nd i.f. transformer (L6, L7, C26, R15)
11908	Washer—"C" washer for holding shaft, Stock No. 34033

STOCK No.	DESCRIPTION
	MOTOR ASSEMBLIES
32654	Ball—Ball for turntable bearing
33897	Base—Motor base and ball assembled
33902	Motor—Complete motor 105-125 volts, 60 cycle (M1)
34496	Motor—Complete motor 105-125 volts, 50 cycle (M1)
33896	Mounting—Motor cradle mounting hardware and retainer
	PICKUP AND ARM ASSEMBLIES
33591	Arm—Pickup arm only—less cartridge, base and cable
34481	Arm—Pickup pivot arm and shaft
34482	Base—Pickup mounting base
34758	Bushing—Rubber bushing and metal bushing for pickup pivot arm shaft
33122	Crystal—Pickup crystal cartridge and needle screw
34311	Ring—Retaining ring for pivot shaft
33529	Screw—Needle screw
	SPEAKER ASSEMBLIES (RL 81-2)
32907	Cap—Dust cap
34554	Cone—Cone complete with suspension and voice coil
5118	Plug—3-prong male plug for speaker
34846	Transformer—Output transformer
	SPEAKER ASSEMBLIES (84843-1)
34847	Cone—Cone complete with voice coil, center suspensions, dust screen and rim gaskets
5118	Plug—3-prong male plug for speaker
34848	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
33680	Cup—Needle cup
34849	Dial—Glass dial scale
34850	Hinge—Lid hinge
33942	Knob—"Radio-Phono" switch knob
30863	Knob—Tuning or volume control and power switch knob
30870	Plug—2-contact male plug for motor leads
32610	Rest—Rubber pickup rest
30900	Spring—Retaining spring for knobs, Stock Nos. 33942 and 30863
32627	Support—Lid support
33467	Switch—Combination "Radio-Phono" switch tone control (S2)
33899	Turntable—Turntable complete with spindle and rubber drive tire

Miscellaneous Service Data

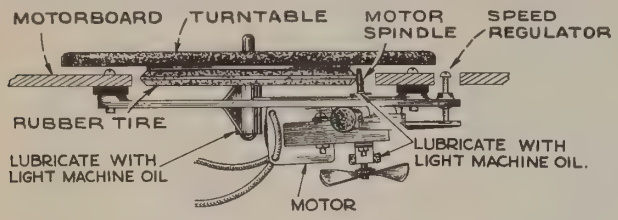
PHONOGRAPH MECHANISM.—

The phonograph motor is self-starting and operates the turntable through friction drive between the motor spindle and the rubber tire on the underside of the turntable.

The rubber driving tire on the turntable should never be removed since it is ground in to be concentric with the spindle. If replacement is required, the entire turntable should be replaced.

The speed regulator raises and lowers the motor. This changes the driving ratio between the motor and the turntable due to the motor spindle being conical in shape. It is important to adjust this regulator for a turntable speed of 78 r.p.m. WHILE PLAYING A 10-INCH RECORD WITH THE NEEDLE APPROXIMATELY ONE INCH FROM THE OUTER EDGE OF THE RECORD.

Lubrication.—The motor should be lubricated as follows: Place a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturate the oil retaining felt pads on the motor shaft with S.A.E. 10 oil. This oiling process should be repeated once or twice a year. **CAUTION.—THE MOTOR DRIVE SPINDLE AND RUBBER DRIVING TIRE ON THE TURNTABLE MUST BE KEPT CLEAN AND ENTIRELY FREE FROM OIL AND GREASE AT ALL TIMES.**



Alignment Procedure

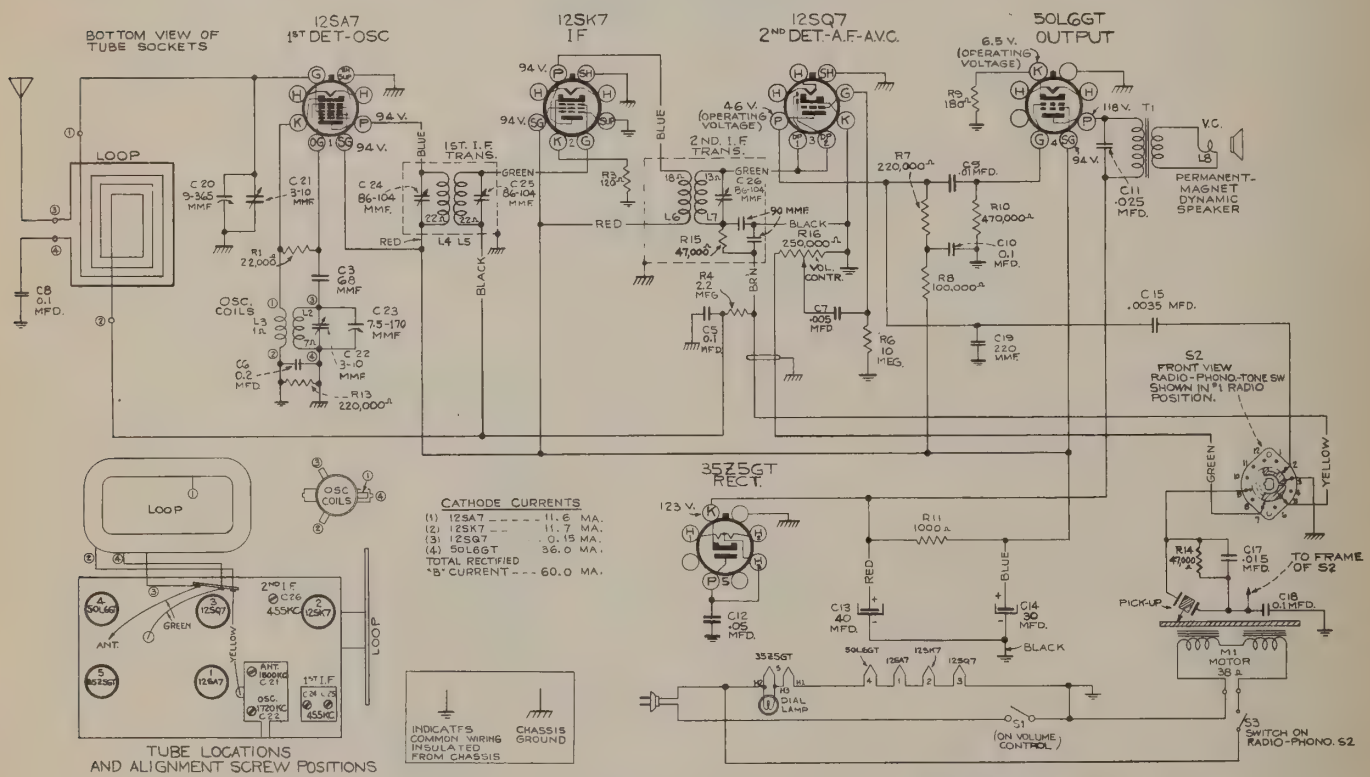
Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

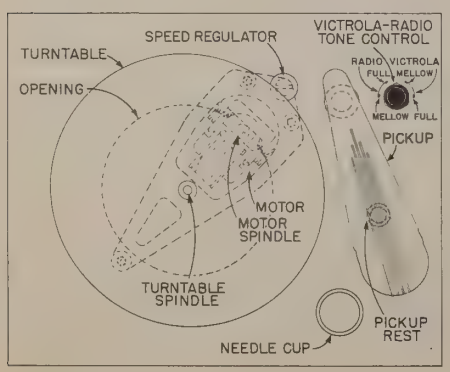
Test Oscillator.—Connect the low side of the test oscillator to the receiver chassis through a 0.01 mfd capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should coincide with the left hand mark stamped in the dial backplate.

Antenna.—This set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the green antenna lead, stapled to the base of the cabinet. The antenna should not be longer than 100 feet including the lead-in. If it is longer, connect a 100 mmfd. capacitor in series with the lead-in.

Steps	Connect the high side of test oscillator to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for max. output—
1	Tuning Cond. stator (det.) in series with 0.01 mfd.	455 kc	Quiet Point at 1,600 kc end of dial	C24, C25, C26 (1st and 2nd I-F transformers)
2	Antenna lead (green) in series with 100 mmfd.	1,720 kc	Full Clockwise (out of mesh)	C22 (osc.)
3		1,500 kc	Resonance on 1,500 kc signal	C21 (ant.)





At Left—
Top View of Motorboard

At Right—
Model U-9

Trademark "Victrola," "RCA Victor," "Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.
Printed in U. S. A.

RCA VICTROLA MODEL U-9 (2nd Prod.)

Chassis No. RC-482C

Five-Tube, Single-Band, A-C, Superheterodyne

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE
Standard Broadcast and one Police Band ..... 540-1,720 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st Detector—Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd Detector, A.V.C., A.F.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Rectifier

PILOT LAMP (1) ..... Mazda No. 51, 7.5 volts, 0.2 amp.

LOUDSPEAKER (RL-81-A3)
Type ..... 5-inch P M Dynamic
Voice Coil Impedance ..... 4.0 ohms at 400 cycles

PICKUP ..... Crystal
Pickup Impedance ..... 0.1 meg. at 1,000 cycles

PHONO MECHANISM ..... { Self-starting motor / Edge-driven turntable / Adjustable Speed

POWER OUTPUT RATING
Undistorted ..... 0.71 watts
Maximum ..... 1.36 watts

POWER SUPPLY RATINGS
A-6 ..... 105-125 volts, 60 cycles
A-5 ..... 105-125 volts, 50 cycles

POWER CONSUMPTION ..... 55 watts

CABINET DIMENSIONS
10-5/16 in. high ..... 17-7/16 in. wide ..... 13⅜ in. deep
Tuning Drive Ratio ..... 12 to 1
Shipping Weight ..... 23½ lbs.
Net Weight ..... 22 lbs.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-482C)
12724	Capacitor—120 mmfd. (C27)
13057	Capacitor—68 mmfd. (C3)
34459	Capacitor—.0025 mfd. (C15)
11315	Capacitor—.015 mfd. (C17)
30938	Capacitor—.025 mfd. (C7, C11)
4937	Capacitor—.01 mfd. (C8, C9)
32787	Capacitor—.05 mfd. (C12)
4839	Capacitor—0.1 mfd. (C5, C10, C18)
34505	Capacitor—0.2 mfd. (C6)
34873	Capacitor—Electrolytic comprising 1 section of 40 mfd. and 1 section of 30 mfd.
34443	Coil—Oscillator coil
34843	Condenser—Tuning condenser
34034	Control—Volume control and power switch
32634	Cord—Drive cord
33453	Drum—Drive cord drum
34841	Frame—Dial and drive frame complete—less indicator drive cord, tuning shaft and drive drum
34842	Indicator—Station selector indicator
11765	Lamp—Dial lamp
35130	Loop—Antenna loop
30868	Plug—2-contact female plug for motor cable
5119	Plug—3-contact female plug for speaker cable
12071	Resistor—120 ohms, ½ watt (R9)
3153	Resistor—1,500 ohms, 1 watt (R11)
13998	Resistor—22,000 ohms, ½ watt (R1)
5132	Resistor—47,000 ohms, 1/10 watt
12412	Resistor—47,000 ohms, ½ watt (R14)
14560	Resistor—100,000 ohms, ½ watt (R8)
12264	Resistor—220,000 ohms, ½ watt (R7, R13)
12285	Resistor—470,000 ohms, ½ watt (R10)
12679	Resistor—2.2 meg., ½ watt (R4, R17)
13601	Resistor—10 meg., ½ watt (R6)
34033	Shaft—Tuning shaft
34449	Socket—Dial lamp socket
32537	Socket—Tube socket
33296	Spring—Retaining spring for drum Stock No. 33453
34844	Transformer—First I-F transformer
34442	Transformer—Second I-F transformer
11908	Washer—"C" washer for holding shaft Stock No. 34033

STOCK No.	DESCRIPTION
	MOTOR ASSEMBLIES
32654	Ball—Ball for turntable bearing
33897	Base—Motor base and ball assembled
33902	Motor—Complete motor 105-125 volts, 60 cycle (M1)
34496	Motor—Complete motor 105-125 volts, 50 cycle (M1)
33896	Mounting—Motor cradle mounting hardware and retainer
	PICKUP AND ARM ASSEMBLIES
33591	Arm—Pickup arm only—less cartridge, base and cable
34481	Arm—Pickup pivot arm and shaft
34482	Base—Pickup mounting base
34758	Bushing—Rubber bushing and metal bushing for pickup pivot arm shaft
33122	Crystal—Pickup crystal cartridge and needle screw
34311	Ring—Retaining ring for pivot shaft
33529	Screw—Needle screw
	SPEAKER ASSEMBLIES (RL-81A3)
32907	Cap—Dust cap
35570	Cone—Cone complete with voice coil
5118	Plug—3-prong male plug for speaker
35904	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
33680	Cup—Needle cup
34849	Dial—Glass dial scale
34850	Hinge—Lid hinge
33942	Knob—"Radio-Phono." switch knob
30863	Knob—Tuning or volume control and power switch knob
30870	Plug—2-contact male plug for motor leads
32610	Rest—Rubber pickup rest
30900	Spring—Retaining spring for knobs Stock No. 33942 and 30863
32627	Support—Lid support
33467	Switch—Combination "Radio-Phono." switch tone control
33899	Turntable—Turntable complete with spindle and rubber drive tire

Miscellaneous Service Data

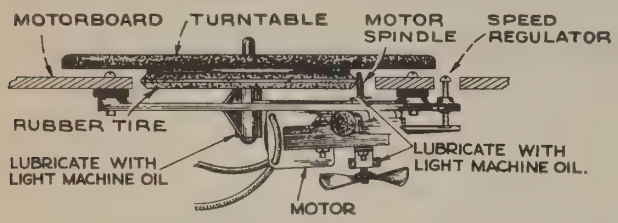
PHONOGRAPH MECHANISM.—

The phonograph motor is self-starting and operates the turntable through friction drive between the motor spindle and the rubber tire on the underside of the turntable.

The rubber driving tire on the turntable should never be removed since it is ground in to be concentric with the spindle. If replacement is required, the entire turntable should be replaced.

The speed regulator raises and lowers the motor. This changes the driving ratio between the motor and the turntable due to the motor spindle being conical in shape. It is important to adjust this regulator for a turntable speed of 78 r.p.m. WHILE PLAYING A 10-INCH RECORD WITH THE NEEDLE APPROXIMATELY ONE INCH FROM THE OUTER EDGE OF THE RECORD.

Lubrication.—The motor should be lubricated as follows: Place a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturate the oil retaining felt pads on the motor shaft with S.A.E. 10 oil. This oiling process should be repeated once or twice a year. **CAUTION.—THE MOTOR DRIVE SPINDLE AND RUBBER DRIVING TIRE ON THE TURNTABLE MUST BE KEPT CLEAN AND ENTIRELY FREE FROM OIL AND GREASE AT ALL TIMES.**



Alignment Procedure

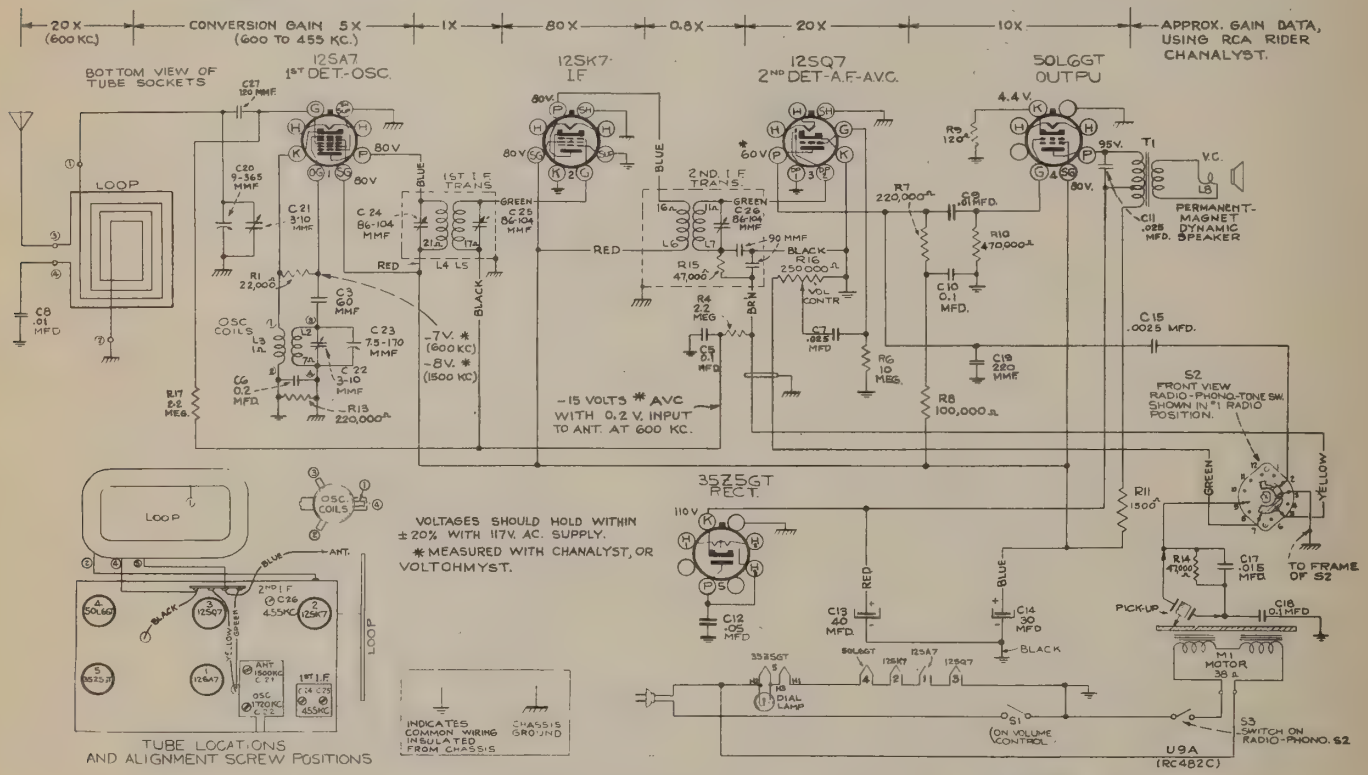
Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

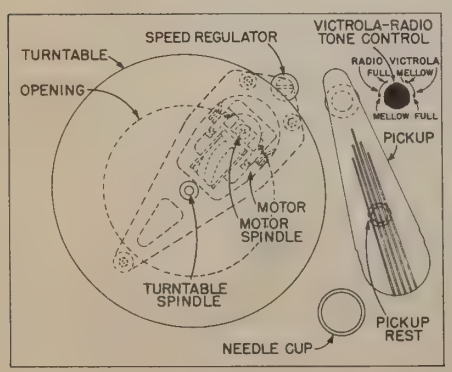
Test Oscillator.—Connect the low side of the test oscillator to the receiver chassis through a 0.01 mfd capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should coincide with the left hand mark stamped in the dial backplate.

Antenna.—This set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the green antenna lead, stapled to the base of the cabinet. The antenna should not be longer than 100 feet including the lead-in. If it is longer, connect a 100 mmfd. capacitor in series with the lead-in.

Steps	Connect the high side of test oscillator to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for max. output—
1	Tuning Cond. stator (det.) in series with 0.01 mfd.	455 kc	Quiet Point at 1,600 kc end of dial	C24, C25, C26 (1st and 2nd I-F transformers)
2	Antenna lead (green) in series with 100 mmfd.	1,720 kc	Full Clockwise (out of mesh)	C22 (osc.)
3		1,500 kc	Resonance on 1,500 kc signal	C21 (ant.)





LEAD	DRESS
black-high side of AC line	Away from R10, C9, R7 and C15; against side of chassis
heaters	down against chassis
C7, C9, C19, C15, R6, R7, R10, Shield Cable (green and yellow)	up away from chassis
blue and brown leads from phono switch	Tape to shielded cable away from phone switch black leads
green converter lead	Against base and away from diode lead
green diode lead	Away from 12SQ7 grid

RCA Victor

MODEL U-10

Chassis No. RC-418B

Five-Tube, Single-Band, A-C, Superheterodyne Victrola

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 35 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE
Standard Broadcast and one Police Band ..... 540-1,720 kc
INTERMEDIATE FREQUENCY ..... 455 kc

NUMBER OF PUSH BUTTONS ..... Six

TUBE COMPLEMENT
(1) RCA-6SA7.. 1st Detector—Oscillator
(2) RCA-6SK7..... I-F Amplifier
(3) RCA-6SQ7.. 2nd Det., A.V.C., A.F.
(4) RCA-6F6-G..... Power Output
(5) RCA-5Y3-G..... Rectifier

PILOT LAMP (1)..... Mazda No. 51, 7.5 volts, 0.2 amp.

LOUDSPEAKER (RL-78-6)
Type..... 5-inch electrodynamic
Voice Coil Impedance..... 3.4 ohms at 400 cycles

PICKUP..... Crystal
Pickup Impedance. 0.1 meg. at 1,000 cycles

PHONO MECHANISM. Self starting motor, edge-driven turntable, adjustable speed

POWER OUTPUT RATING
Undistorted..... 2.5 watts
Maximum..... 4.5 watts

POWER SUPPLY RATINGS
A-6..... 105-125 volts, 60 cycles
A-5..... 105-125 volts, 50 cycles
C-6... 105-125, 200-250 volts, 60 cycles
C-5... 105-125, 200-250 volts, 50 cycles

POWER CONSUMPTION ..... 100 watts

CABINET DIMENSIONS
11⅜-in. high, 15¼-in. wide, 13⅛-in. deep

CHASSIS DIMENSIONS
2½-in. high, 12-in. wide, 5⅝-in. deep

Maximum Chassis Height..... 6¾ inches
Tuning Drive Ratio..... 10 to 1
Shipping Weight..... 24 lbs.
Net Weight..... 22½ lbs.

Miscellaneous Service Data

PHONOGRAPH MECHANISM.—

The phonograph motor is self-starting and operates the turntable through friction drive between the motor spindle and the rubber tire on the underside of the turntable.

The rubber driving tire on the turntable should never be removed since it is grounded in to be concentric with the spindle. If replacement is required, the entire turntable should be replaced.

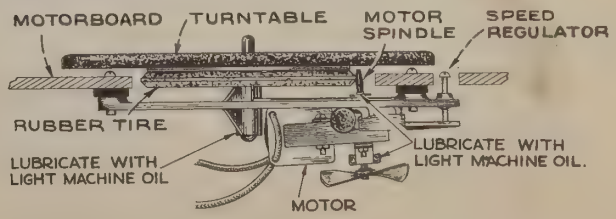
The speed regulator raises and lowers the motor. This changes the driving ratio between the motor and the turntable due to the motor spindle being conical in shape. It is important to adjust this regulator for a turntable speed of 78 r.p.m. WHILE PLAYING A 10-INCH RECORD WITH THE NEEDLE APPROXIMATELY ONE INCH FROM THE OUTER EDGE OF THE RECORD.

Lubrication.—The motor should be lubricated as follows: Place a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturate the oil retaining felt pads on the motor shaft with S.A.E. 10 oil. This oiling process should be repeated once or twice a year. **CAUTION.—THE MOTOR DRIVE SPINDLE AND RUBBER DRIVING TIRE ON THE TURNTABLE MUST BE KEPT CLEAN AND ENTIRELY FREE FROM OIL AND GREASE AT ALL TIMES.**

POWER LINE ANTENNA.—

This instrument is equipped with a built-in power line antenna. To use this antenna, the link on the antenna terminal board should be connected between "A" and "L," thus connecting the antenna input of the receiver through a capacitor to the power line. Reversing the power plug may inprove reception. If an external antenna is used, it should be connected to "A," a ground connection made to "G," and the link removed.

POWER-VOLUME CONTROL — THREE PURPOSE TONE CONTROL — TUNING CONTROL



First Edition

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the chassis drawing.

Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

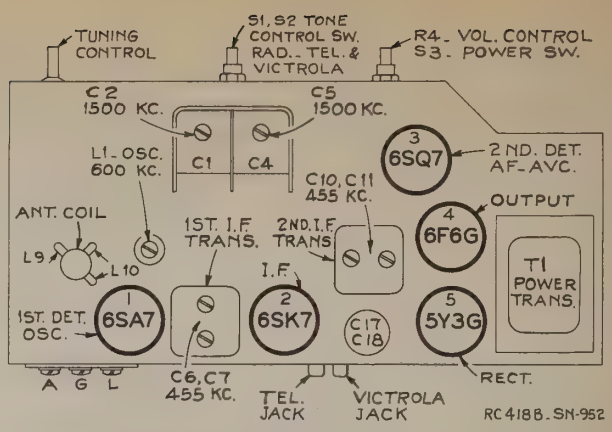
Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

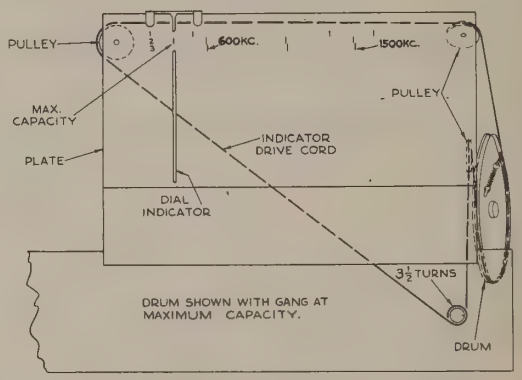
For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect the high side of the test-osc. to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Antenna Terminal	455 kc	Quiet Point between 1,720-1,500 kc	C10 and C11 (2nd I-F trans.)
2				C6 and C7 (1st I-F trans.)
3	Ant. terminal in series with 200 mmfd.	1,500 kc	1,500 kc calibration mark	C5 (osc.) C2 (ant.)
4		600 kc	600 kc calibration mark	L1 (osc.)*
5	Repeat step 3			

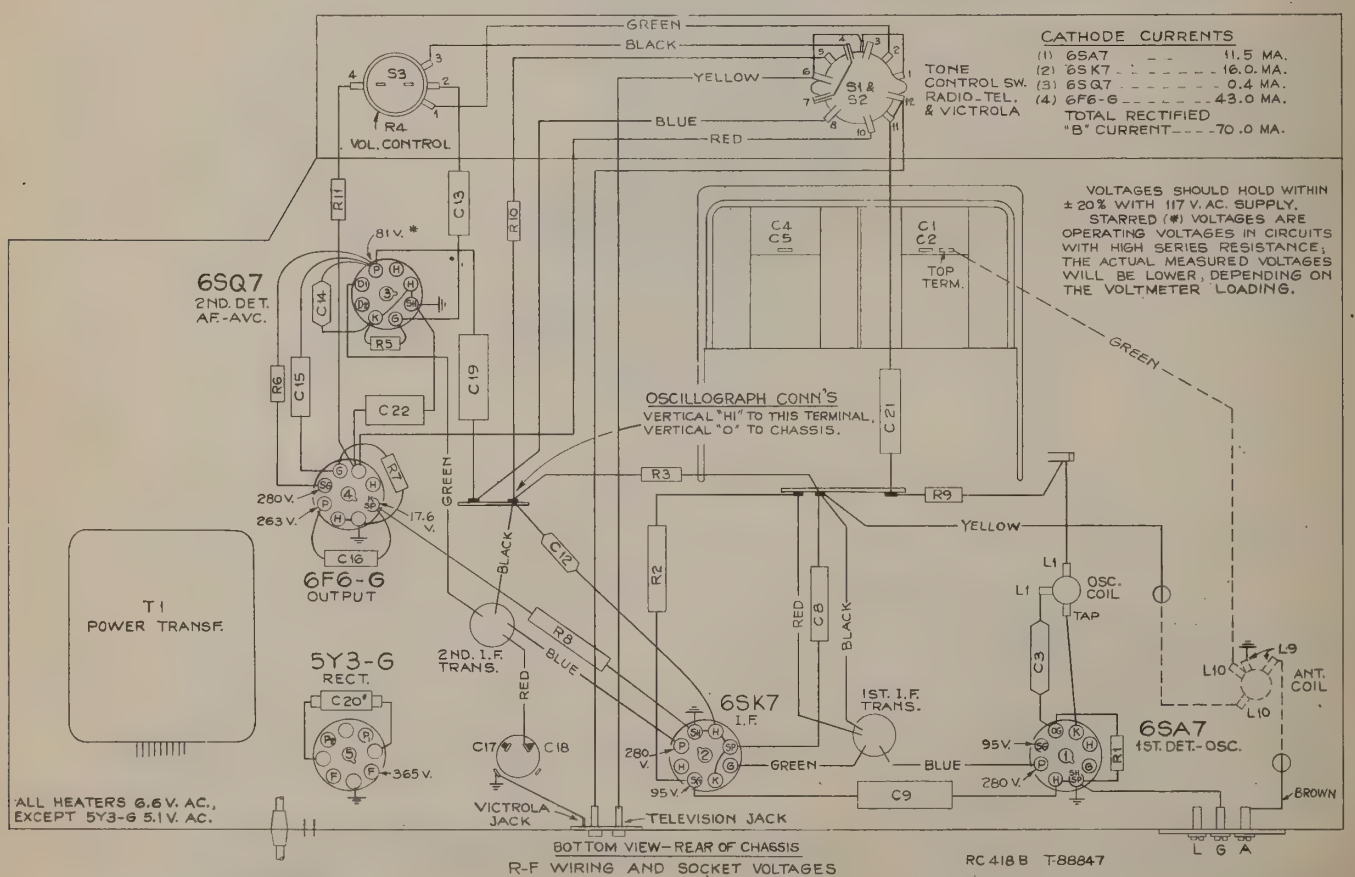
Note.—Oscillator tracks above signal.

* Rock gang condenser slightly while adjusting L1.





DIAL MECHANISM AND CALIBRATION MARKS.

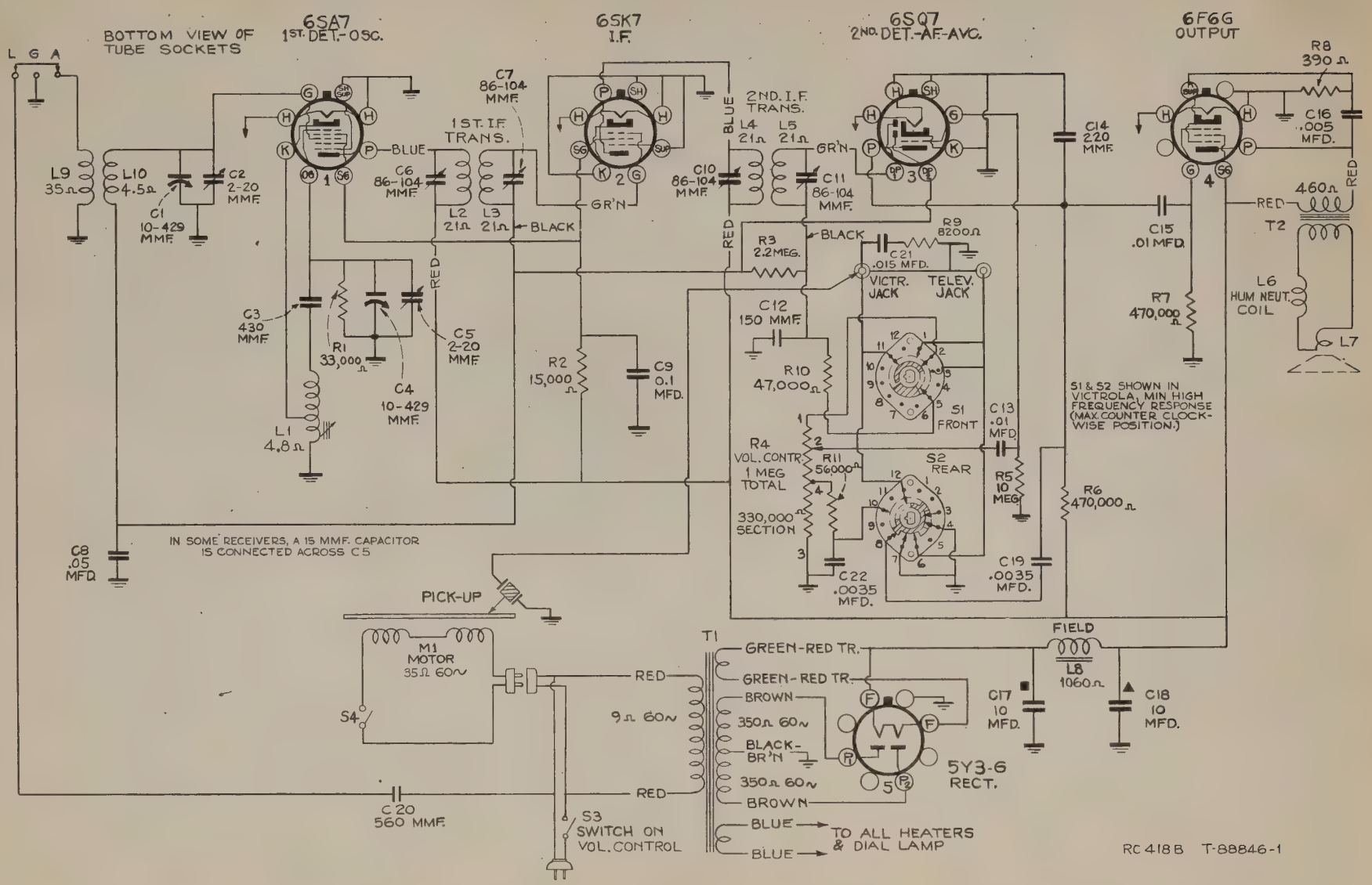


R-F WIRING AND SOCKET VOLTAGES

RC 418 B T-88847

PRECAUTIONARY LEAD DRESS.—

1. Power cord leads must be dressed up away from 6SQ7 socket, and toward end of chassis.
2. Green lead 2nd I.F. to 6SQ7 must be dressed against base.
3. Blue lead 2nd I.F. to 6SK7 must be dressed close to base.
4. Green and blue leads from 1st I.F. transformer must be dressed close to base.
5. Red lead from "L" terminal on antenna board to 5Y3G socket must be dressed against base.
6. Green lead from gang to 6SA7 socket must be dressed toward side apron away from other parts.


BOTTOM VIEW OF TUBE SOCKETS
6SA7 1ST. DET.-OSC.
6SK7 I.F.
6SQ7 2ND. DET.-AF-AVC.
6F6G OUTPUT
L G A
L9 35Ω
L10 4.5Ω
C1 10-429 MMF.
C2 2-20 MMF.
C7 86-104 MMF.
1ST. I.F. TRANS.
C6 86-104 MMF.
L2 21Ω
L3 21Ω
BLUE
BLACK
GR'N
RED
2ND. I.F. TRANS.
L4 21Ω
L5 21Ω
C10 86-104 MMF.
C11 86-104 MMF.
C14 220 MMF.
R8 390Ω
C16 .005 MFD.
460Ω
T2
L6 HUM NEUT. COIL
L7
C15 .01 MFD.
R7 470,000Ω
R9 8200Ω
C21 .015 MFD.
R3 2.2MEG.
VICTR. JACK
TELEV. JACK
C3 430 MMF.
R1 33,000Ω
C4 10-429 MMF.
C5 2-20 MMF.
L1 4.8Ω
R2 15,000Ω
C9 0.1 MFD.
C12 150 MMF.
R10 47,000Ω
S1 FRONT
S1 & S2 SHOWN IN VICTROLA, MIN HIGH FREQUENCY RESPONSE (MAX. COUNTER CLOCK-WISE POSITION.)
C13 .01 MFD.
R4 VOL. CONTR. 1 MEG TOTAL
R11 56,000Ω
330,000Ω SECTION
S2 REAR
R5 10 MEG.
R6 470,000Ω
C22 .0035 MFD.
C19 .0035 MFD.
C8 .05 MFD.
IN SOME RECEIVERS, A 15 MMF. CAPACITOR IS CONNECTED ACROSS C5
PICK-UP
M1 MOTOR 35Ω 60~
S4
T1
GREEN-RED TR.
GREEN-RED TR.
BROWN
9Ω 60~
350Ω 60~
BLACK-BR'N
350Ω 60~
BROWN
BLUE
BLUE
TO ALL HEATERS & DIAL LAMP
FIELD
L8 1060Ω
C17 10 MFD.
C18 10 MFD.
5Y3-6 RECT.
C20 560 MMF.
S3 SWITCH ON VOL. CONTROL
RC 418 B T-88846-1

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

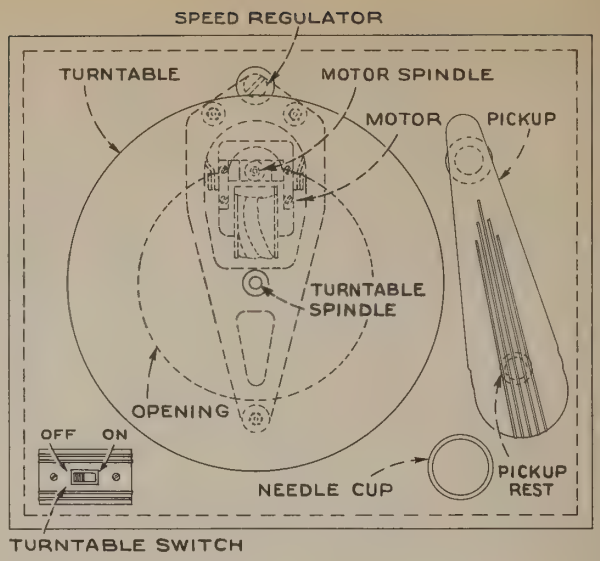
2. Turn the accessory switch to "Radio" position and accurately tune in the station for which the first button is to be set.

3. Press in push-button rod No. 1 (left) with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Replace the push-button on its shaft.

5. Proceed in a similar manner for the remainder of the push-buttons.

6. Insert the station marker tabs in the recesses above the push-buttons.



At Right—Top View of Motorboard

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-418B)
33719	Belt—Tuning unit push arm belt
33718	Board—Antenna-Ground terminal board
12725	Capacitor—150 mmfd. (C12)
12694	Capacitor—220 mmfd. (C14)
32599	Capacitor—430 mmfd. (C3)
12537	Capacitor—560 mmfd. (C20)
30303	Capacitor—.0035 mfd. (C19, C22)
33584	Capacitor—.005 mfd. (C16)
4937	Capacitor—.01 mfd. (C15)
14393	Capacitor—.01 mfd. (C13)
11315	Capacitor—.015 mfd. (C21)
32787	Capacitor—.05 mfd. (C8)
4839	Capacitor—0.1 mfd. (C9)
33724	Coil—Oscillator coil
33775	Coil—Antenna coil (L9, L10)
32342	Condenser—Electrolytic, 2 sections 10 mfd. each
33776	Control—Volume control and power switch (R4, S3)
32634	Cord—Drive cord
33633	Indicator—Dial scale pointer
11765	Lamp—Dial lamp (Mazda 51)
33431	Link—Antenna link
33727	Plate—Dial plate assembly
30868	Plug—2 contact female plug for speaker cable
31388	Resistor—390 ohms, 1 watt (R8)
14075	Resistor—8,200 ohms, ½ watt (R9)
33489	Resistor—15,000 ohms, 2½ watts (R2)
12454	Resistor—33,000 ohms, ½ watt (R1)
12412	Resistor—47,000 ohms, ½ watt (R10)
12286	Resistor—56,000 ohms, ½ watt (R11)
12285	Resistor—470,000 ohms, ½ watt (R6, R7)
12679	Resistor—2.2 megohms, ½ watt (R3)
13601	Resistor—10 megohms, ½ watt (R5)
33725	Shaft—Tuning knob shaft
31319	Socket—Tube socket
31364	Socket—Dial lamp socket
31365	Socket—Lamp socket
33514	Socket—Phonograph input socket
33720	Spring—Push arm return spring
33894	Switch—Tone, Radio-Phono, or Television switch (S1, S2)
33722	Transformer—First i-f transformer
33895	Transformer—Second i-f transformer (L4, L5, C10, C11)
33619	Transformer—Power transformer 105-120 volts, 25-60 cycles (T1)
33112	Transformer—Power transformer 105-120 volts, 50-60 cycle (T1)
31575	Transformer—Power transformer 110-220 volts, 60 cycle
33726	Washer—"C" washer for tuning shaft
	MOTOR ASSEMBLIES
33897	Base—Motor base and ball assembled
33902	Motor—Complete motor 105-125 volts, 60 cycle (M1)
34496	Motor—Complete motor 105-125 volts, 50 cycle (M1)
33896	Mounting—Motor cradle mounting hardware and retainer
	PICKUP ASSEMBLIES
33591	Arm—Pickup arm—top shell only
33898	Base—Pivot arm and base assembly
33122	Crystal—Pickup crystal cartridge complete
	SPEAKER ASSEMBLIES (RL-78-5)
32907	Cap—Cone center dust cap
32906	Coil—Hum neutralizing coil (L6)
33601	Coil—Speaker field coil (L8)
32904	Cone—Speaker cone and voice coil (L7)
32905	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33731	Button—Push button complete
31456	Cover—Protective cover for push button markers
32625	Cup—Needle cup
33729	Dial—Glass dial scale
33637	Escutcheon—Glass dial escutcheon less scale and push buttons
33972	Escutcheon—Motor switch escutcheon
13085	Hinge—Lid hinge
30863	Knob—Tuning, volume control and power switch knob
33942	Knob—Tone control knob (white dot)
33973	Marker—Push button markers
33901	Mounting—Motor mounting hardware
30870	Plug—2 prong male plug for motor leads
31048	Plug—2 conductor pin plug for phonograph input
30900	Spring—Push button and knob retaining spring
31164	Support—Lid support
33900	Switch—Phono motor switch (S4)
33899	Turntable—Turntable complete with rubber tire and spindle

RCA Victor

MODEL U-12

Chassis No. RC-425-A

Seven-Tube, Two-Band, AC, Superheterodyne Victrola

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 36 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast ..... 540-1,720 kc
Short Wave ..... 5.6-20 mc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SA7 .. 1st. Detector-Oscillator
(2) RCA-6SK7 ..... I-F Amplifier
(3) RCA-6SQ7 .. 2nd. Detector, A.V.C., and A-F Amplifier
(4) RCA-6SF5 ..... Inverter
(5) RCA-6F6-G ..... Power Output
(6) RCA-6F6-G ..... Power Output
(7) RCA-5Y3-G ..... Rectifier

PILOT LAMPS (1) ..... Mazda No. 51, 6.3 volts, 0.20 amp.

POWER OUTPUT RATING

Undistorted ..... 5.0 watts
Maximum ..... 6.0 watts

LOUDSPEAKER (RL-79A-1)

Type ..... 6-inch electrodynamic
V.C. Impedance ... 3.4 ohms at 400 cycles

PHONOGRAPH

Crystal Pickup . 100,000 ohms Impedance at 1,000 c.p.s.
Average Output of Pickup .. 1½ volts at 1,000 c.p.s. across 250,000 ohms load
Motor ... Self-starting, Rim drive, Adjustable speed

POWER SUPPLY RATINGS

Rating A-6 ... 105-125 volts, 60 cycles, 110 watts
Rating A-5 ..... 105-125 volts, 50 cycles, 110 watts
Rating C-6 ... 105-125, 210-250 volts, 60 cycles, 110 watts
Rating C-5 .... 105-125, 210-250 volts, 50 cycles, 110 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	12 7/32	19½	13 3/16
Chassis Base Dimensions (inches)	2¼	12⅛	5¾
Over-all Chassis Height			6⅞ inches
Weight			39 lbs. (Shipping)
Tuning Drive Ratio			10 to 1

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up for any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

2. Set the receiver for "Radio" operation, range selector on "Broadcast", and accurately tune in the station for which the first button is to be set.

3. Press in the first push-button rod (left) with the screwdriver as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Replace the push-button on its shaft.

5. Proceed in a similar manner for the remainder of the push-buttons.

6. Insert the station marker tabs in the recesses above the push-buttons.

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Printed in U. S. A.

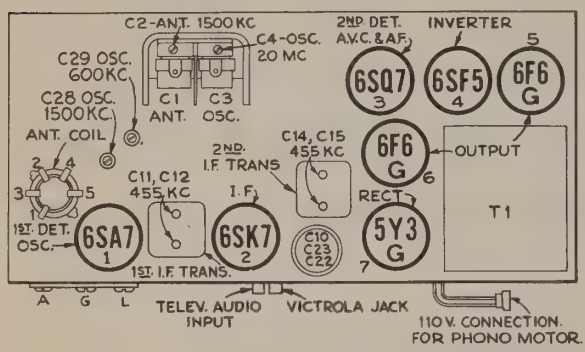
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid A.V.C. action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks corresponding to dial readings of 600 kc, 1,500 kc, 6.1 mc, and 20 kc have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.



Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the mark at the extreme left (low frequency) end of the dial scale.

Step	Connect the high side of the test-osc. to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Antenna terminal	455 kc	"A" Band Quiet Point between 550-750 kc	C14 and C15 (2nd I-F Trans.)
2				C11 and C12 (1st I-F Trans.)
3	Ant. terminal in series with 300 ohms	20 mc	"C" Band 20 mc calibration mark	C4 (osc.)*
4	Ant. terminal in series with 200 mmf.	1,500 kc	"A" Band 1,500 kc calibration mark	C28 (osc.) C2 (ant.)
5		600 kc	"A" Band 600 kc calibration mark	C29 (osc.) Rock Gang
6	Repeat step 4			

* Use **minimum** peak if two can be obtained. Check to determine that C4 has been adjusted properly by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

Note: Oscillator tracks above signal on both bands.

Miscellaneous Service Data

Phonograph Mechanism:

The phonograph motor is self-starting and operates the turntable through friction drive between the motor spindle and the rubber tire on the underside of the turntable.

The rubber driving tire on the turntable should never be removed since it is ground in to be concentric with the spindle.

The speed regulator raises and lowers the motor. This changes the driving ratio between the motor and the turntable due to the motor spindle being conical in shape. It is important to adjust this regulator for a turntable speed of 78 r.p.m. WHILE PLAYING A 10-INCH RECORD WITH THE NEEDLE APPROXIMATELY ONE INCH FROM THE OUTER EDGE OF THE RECORD.

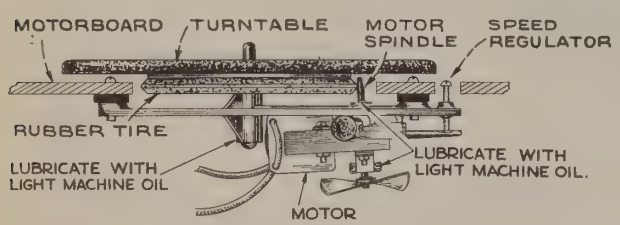
The motor switch is automatic for both starting and stopping, and when properly adjusted, will turn the motor on as the pickup is moved from the pickup rest toward the turntable. The switch should be adjusted so that it will snap into the "off" position when the pickup needle is 1¾ inches from the center line of the turntable shaft.

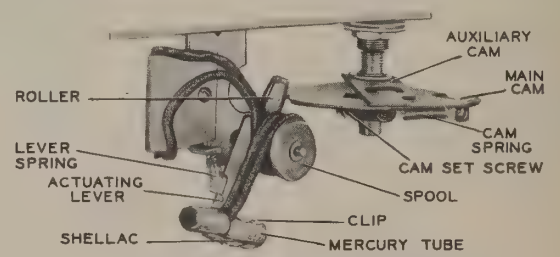
The motor may be shut off at any time by placing the pickup on the pickup rest.

Lubrication.—The motor should be lubricated as follows: Place a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturate the oil retaining felt pads on the motor shaft with S.A.E. 10 oil. This oiling process should be repeated once or twice a year. CAUTION.—THE MOTOR DRIVE SPINDLE AND RUBBER DRIVING TIRE ON THE TURNTABLE MUST BE KEPT CLEAN AND ENTIRELY FREE FROM OIL AND GREASE AT ALL TIMES.

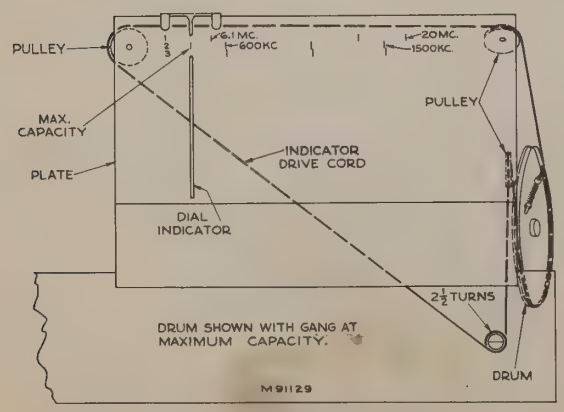
Power Line Antenna:

This instrument is equipped with a built-in power line antenna. To use this antenna the link on the antenna terminal board should be connected between "A" and "L," thus connecting the antenna input of the receiver through a capacitor to the power line. If an external antenna is used, it should be connected to "A," a ground connection made to "G," and the link removed.

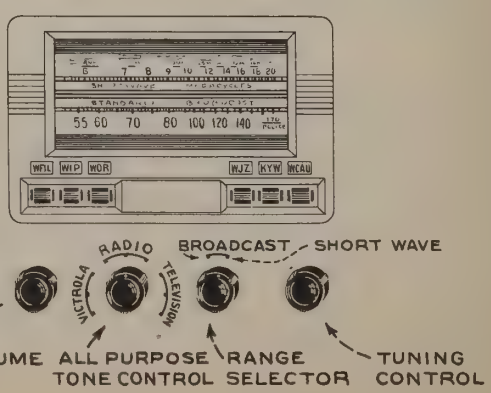


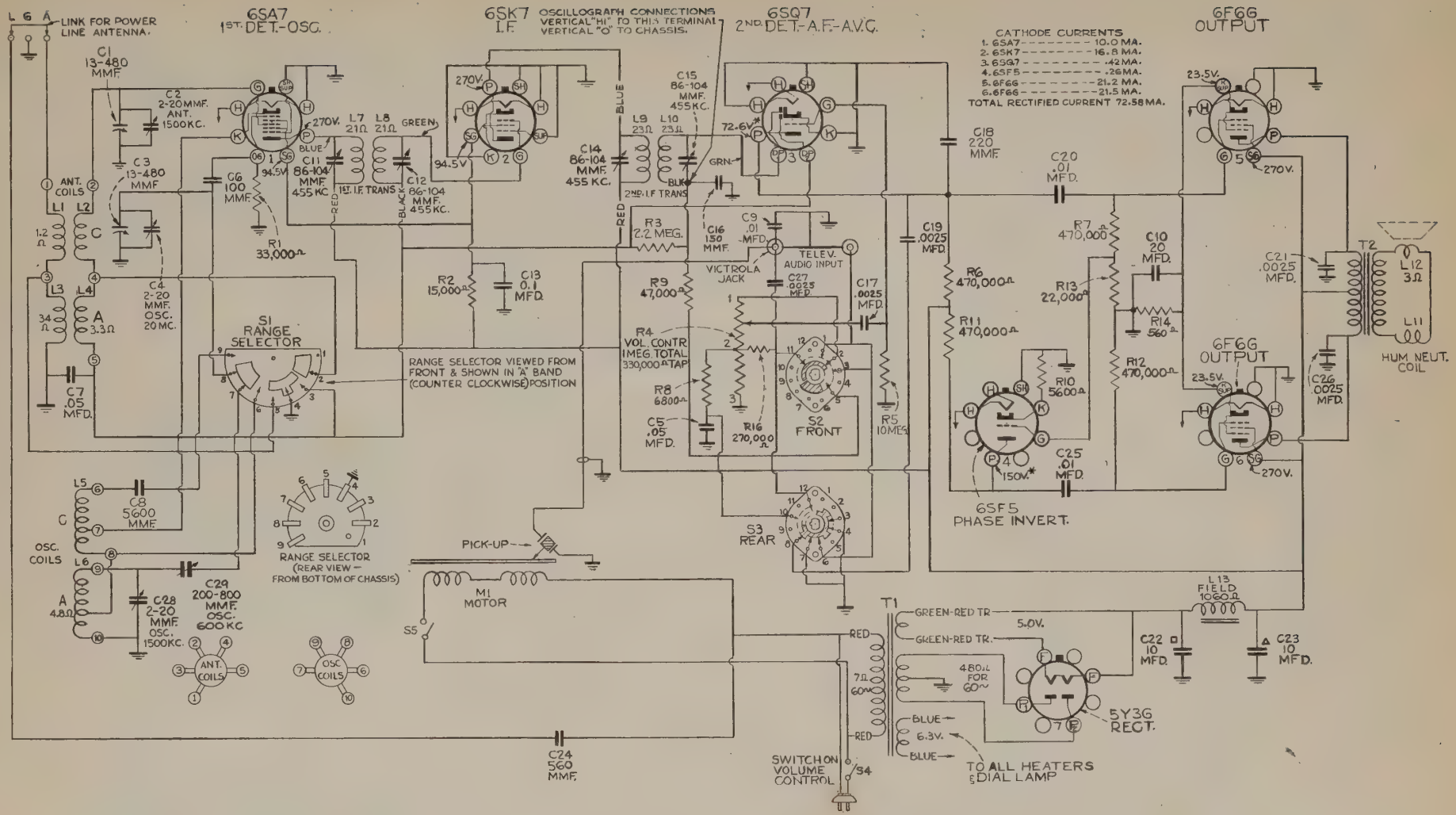


MERCURY SWITCH MECHANISM
(VIEWED FROM FRONT
SHOWN WITH PICKUP IN REST POSITION)



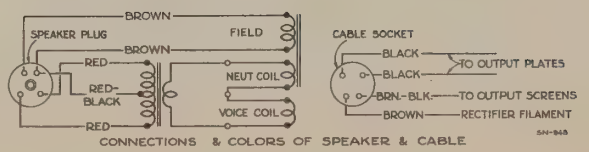
DIAL MECHANISM AND CALIBRATION MARKS.





Precautionary Lead Dress.—

1. Dress the Power Line Antenna lead close to the chassis base and near to the back flange.
2. Heater lead from 6F6-G to the 6SQ7-G must be dressed away from the 10 meg. grid leak (R5).
3. AC leads to the power switch must be dressed away from R8 and C5.
4. C17 should be kept as far away from the power switch as possible.



Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-425A)
33719	Belt—Tuning unit push arm belt
33718	Board—Antenna-ground board
33629	Capacitor—Trimmer capacitor, one section 2-20 mmfd., and one section 300-800 mmfd. (C9, C10)
12720	Capacitor—100 mmfd. (C6)
12725	Capacitor—150 mmfd. (C16)
12694	Capacitor—220 mmfd. (C18)
12537	Capacitor—560 mmfd. (C24)
13895	Capacitor—5,600 mmfd. (C8)
5107	Capacitor—.0025 mfd. (C19, C21, C26)
34459	Capacitor—.0025 mfd. (C17, C27)
4937	Capacitor—.01 mfd. (C9, C20, C25)
32787	Capacitor—.05 mfd. (C7)
4839	Capacitor—0.1 mfd. (C13)
32240	Capacitor—Comprising 2 sections of 10 mfd., and 1 section of 20 mfd. (C10, C22, C23)
33732	Coil—Antenna coil (L1, L2, L3, L4)
33733	Coil—Oscillator coil (L5, L6)
33776	Control—Volume control and power switch (R4, S1)
32634	Cord—Braided silk drive cord
33633	Indicator—Station selector indicator pointer
11765	Lamp—Pilot lamp
33727	Plate—Dial plate assembly—less dial
5119	Plug—4-contact female plug for speaker cable
14439	Resistor—100 ohms, ½ watt (R15)
17214	Resistor—560 ohms, 2 watts (R14)
13714	Resistor—5,600 ohms, ½ watt (R10)
12265	Resistor—6,800 ohms, ½ watt (R8)
33489	Resistor—15,000 ohms, 2½ watts (R2)
13998	Resistor—22,000 ohms, ½ watt (R13)
12454	Resistor—33,000 ohms, ½ watt (R1)
12412	Resistor—47,000 ohms, ½ watt (R9)
12199	Resistor—270,000 ohms, ½ watt (R16)
12285	Resistor—470,000 ohms, ½ watt (R6, R7, R11, R12)
12679	Resistor—2.2 meg., ½ watt (R3)
13601	Resistor—10 meg., ½ watt (R5)
33735	Screw—Push button lock screw
33725	Shaft—Tuning drive shaft
33514	Socket—Phonograph input socket
31364	Socket—Pilot lamp socket
31319	Socket—Tube base socket
33720	Spring—Push arm return spring
33946	Switch—Range switch
33894	Switch—Tone control, phono. or television switch (S2, S3)
33722	Transformer—First i-f transformer (L7, L8, C11, C12)
33895	Transformer—Second i-f transformer (L9, L10, C14, C15)
33619	Transformer—Power transformer—105-125 volts, 25-60 cycles (T1)
34261	Transformer—Power transformer—110 volts, 60 cycles
31575	Transformer—Power transformer—105-125, 200-250 volts, 50-60 cycles (T1)

STOCK No.	DESCRIPTION
	MOTOR ASSEMBLIES
33897	Base—Motor base and ball assembled
33902	Motor—Complete motor 105-125 volts, 60 cycle (M1)
34496	Motor—Complete motor 105-125 volts, 50 cycle (M1)
33896	Mounting—Motor cradle mounting hardware and retainer
	SPEAKER ASSEMBLIES (RL-79A-1)
32907	Cap—Dust cap
33601	Coil—Field coil (L13)
32906	Coil—Neutralizing coil (L11)
5039	Plug—4-prong male speaker plug
33599	Transformer—Output transformer (T2)
	AUTOMATIC SWITCH ASSEMBLIES
32863	Cam—Cam assembly comprising main and auxiliary cam, hub and set screws
32864	Lever—Actuating lever with roller and mercury switch clip
31118	Screw—No. 10-32 x 5/16 fillister head cone pointed set screw
32868	Spring—Actuating lever tension spring
32867	Spring—Cam tension spring
32865	Support—Switch support and terminal board
32866	Switch—Mercury tube with leads (S5)
31608	Washer—"C" washer for holding actuating lever
	PICKUP ASSEMBLIES
33906	Arm—Pickup arm—shell only
33908	Base—Pickup support arm base and retainer
33905	Crystal—Pickup crystal cartridge
33907	Support—Pickup support arm complete—less base
	MISCELLANEOUS ASSEMBLIES
33731	Button—Push button assembly
31456	Cover—8-protective covers for push button marker
33910	Cup—New needle cup
33909	Cup—Used needle cup
34270	Dial—Glass dial scale
33637	Escutcheon—Dial glass escutcheon
13085	Hinge—Cabinet lid hinge
33942	Knob—Tone control or range switch knob
30863	Knob—Tuning or volume control knob
33973	Marker—Push button markers
33901	Mounting—1 set motor mounting hardware
33530	Mounting—Pickup mounting hardware
30870	Plug—2-prong male connectors
31048	Plug—2-conductor male plug for pickup lead
30900	Spring—Retaining spring for knobs, Stock Nos. 30863, 33942 and button No. 33731
31164	Support—Cabinet lid support
33899	Turntable—Complete with rubber drive ring

RCA Victor

VICTROLA MODELS U-20, U-40, U-42

Chassis No. RC-498, RC-498A, RC-498B

Seven- and Eight-Tube, Electric-Tuning, A-C, Superheterodynes

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 42—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

LOUDSPEAKER (RL-70-K1)

Diameter ..... 12 inch
Voice-Coil Impedance at 400 cycles ..... 2.2 ohms

TUBE COMPLEMENT

(1) 6SA7 ..... First Detector, Oscillator
(2) 6K7 ..... I-F Amplifier
(3) 6SQ7 ..... Second Det., A.V.C.
(4) 6SF5 ..... Phase Inverter
(5) 6F6G except some RC-498B use 6K6G ..... Output
(6) 6F6G except some RC-498B use 6K6G ..... Output
(7) 5Y3G in RC-498 and RC-498A ..... Rectifier
(7) 6U5 in RC-498B ..... Tuning Eye
(8) 5Y3G in RC-498B ..... Rectifier

POWER OUTPUT

Undistorted ..... 5 watts, Maximum .....6 watts

POWER SUPPLY RATINGS (U-20)

A-6 ..... 105-125 volts, 60 cycles, 110 watts total
A-5 ..... 105-125 volts, 50 cycles, 110 watts total
B-2 ..... 105-125 volts, 25 cycles, 110 watts total
C-6 ..... 105-125/210-250 volts, 60 cycles, 110 watts total
C-5 ..... 105-125/210-250 volts, 50 cycles, 110 watts total

POWER SUPPLY RATINGS (U-40, U-42)

A-6 ..... 105-125 volts, 60 cycles, 110 watts total
A-5 ..... 105-125 volts, 50 cycles, 110 watts total
B-2 ..... 105-125 volts, 25 cycles, 110 watts total
C-6 ..... 105-130/140-160/200-250 volts, 60 cycles, 110 watts total
C-5 ..... 105-130/140-160/200-250 volts, 50 cycles, 110 watts total

Frequency Range ..... 540 to 1,560 kc and 5.8 to 18 mc.

	U-20	U-40	U-42
Height	38 inches	33 inches	42½ inches
Width	25½ inches	30 inches	30 inches
Depth	15 inches	16¼ inches	17 inches
Net Weight	64 pounds	90 pounds	95 pounds
Shipping Weight	79 pounds	115 pounds	120 pounds

Tuning Drive Ratio ..... 10 to 1

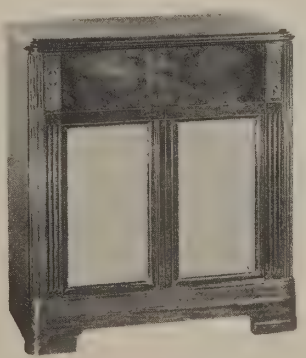
PHONOGRAPH U-20

Type ..... Manual

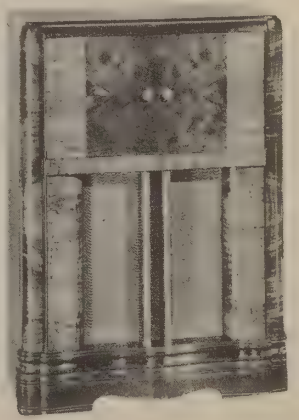
PHONOGRAPH U-40, U-42

Type ..... Automatic
Record Capacity ..... Eight 10-inch or seven 12-inch

U-20



U-40



U-42

First Edition

Trademarks "Victrola" and "RCA Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Before proceeding with alignment the following lead dress should be carefully checked.

1. Dress AC switch leads away from 6SF5 tube socket.

2. Do not twist loop leads together or around each other. Spacing between leads from "C" band loop to chassis is important—see alignment step "5" below.

3. "High side" leads from loop sockets, range switch, oscillator coil, and trimmers must be dressed away from chassis and each other.

4. Dress C-6 and C-33 away from each other.

5. Dress C-17 away from power switch leads.

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the chassis schematics.

Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

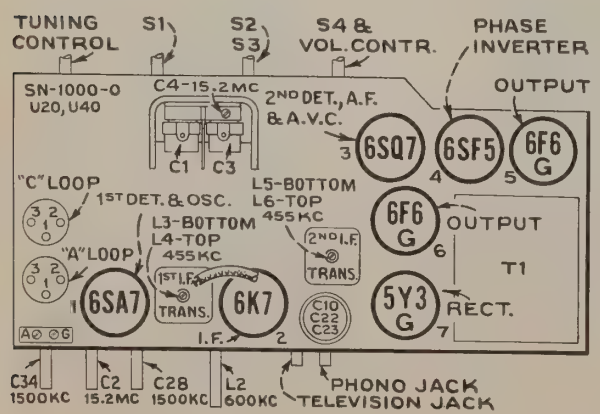
For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect test-osc. output to—	Tune test-osc. to—	Turn radio dial to	Adjust the following for maximum peak output
1	I-F grid through 0.1 mfd capacitor and ground	455 kc	Quiet point between 1,720-1,500 kc	L5 and L6 (2nd I-F trans.)
2	1st det. grid through 0.1 mfd capacitor and ground			L3 and L4 (1st I-F trans.)
3		15.2 mc	15.2 mc	C-4 oscillator*
4	Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver	15.2 mc	Rock at 15.2 mc	C-2 antenna† while rocking
5		6.1 mc	6.1 mc	Spacing between leads from "C" band loop to chassis
6		15.2 mc	Rock at 15.2 mc	C-2 antenna† while rocking
7		1,500 kc	1,500 kc	C-34 antenna C-28 oscillator
8		600 kc	Rock at 600 kc	L-2 oscillator while rocking
9		1,500 kc	1,500 kc	C-34 antenna C-28 oscillator

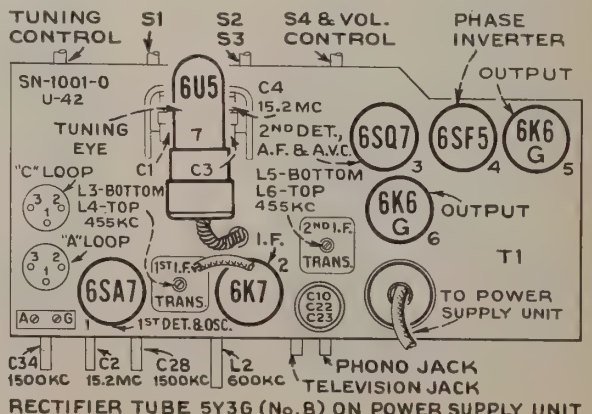
When making adjustments 4 to 9 inclusive the chassis must be in the cabinet, both loops connected, and all leads in their normal positions. When mounting chassis in cabinet if calibration marks on dial plate do not line up with dial scale mounted on cabinet move pointer to agree with dial scale on cabinet.

* Oscillator should track on high frequency side of signal. If two peaks are obtained use high frequency (minimum capacity) peak.

† If two peaks can be obtained use low frequency (maximum capacity) peak.



U-20 and U-40 Tube and Trimmer Locations



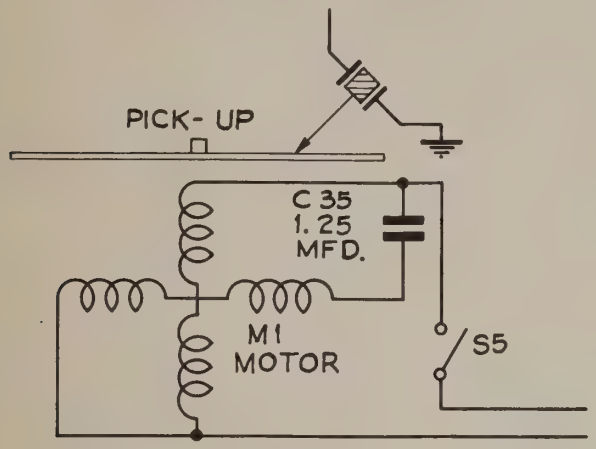
U-42 Tube and Trimmer Locations

Phonograph Information

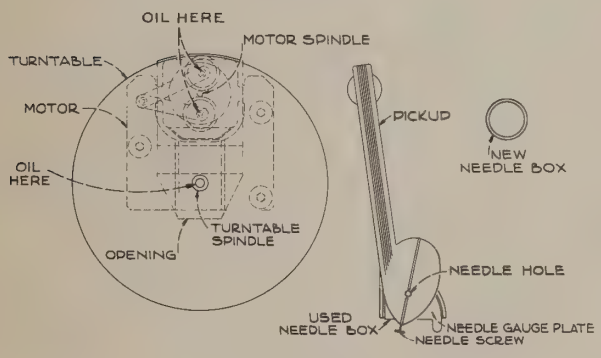
The U-20 phonograph motor has its bearing filled with oil and sealed at the factory and hence should not require lubrication in the field. However the two rubber tired idler pulleys should have their bearings lubricated occasionally with S.A.E. 10 oil. Care should be taken not to get any oil, grease, or other foreign matter on the rubber tires. These tires and the motor spindle should be cleaned occasionally with quick drying naphtha.

The turntable spindle bearing should also be lubricated occasionally with S.A.E. 10 oil.

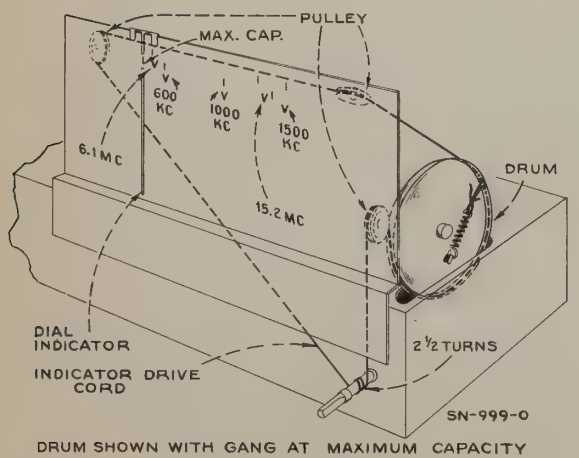
For information regarding the automatic record changers used in models U-40 and U-42 refer to service note No. 41 covering these mechanisms.



U-20 Motor



U-20 Motorboard

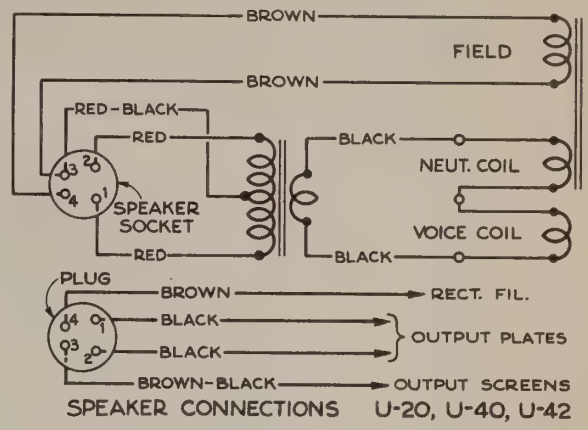


Dial-Indicator and Drive Mechanism

Refer to "Alignment Procedure" for explanation of the "calibration marks" shown in this drawing

Centering Loudspeaker Cone

The loudspeaker cone centering support is fastened to the field frame by two screws accessible from the rear of the speaker. The cone can usually be recentered by loosening these screws and moving the support around until the proper position is found without disturbing the dust cover. However, in some cases it may be necessary to remove the front dust cover and insert spacers between the voice coil and pole piece in order to obtain proper centering. A new dust cover should then be installed.



SPEAKER CONNECTIONS U-20, U-40, U-42

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

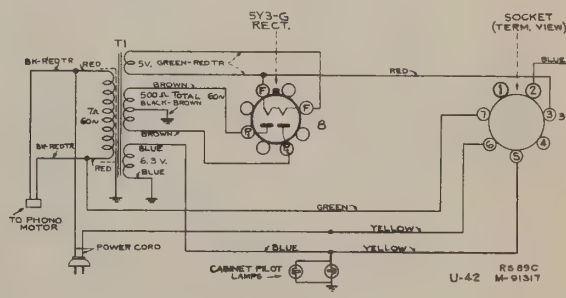
2. Set the radio-phono-television switch to "radio" position and accurately tune in the station for which the first button is to be set.

3. Press in push-button rod No. 1 with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Replace the push-button on its shaft.

5. Proceed in a similar manner for the remainder of the push-buttons.

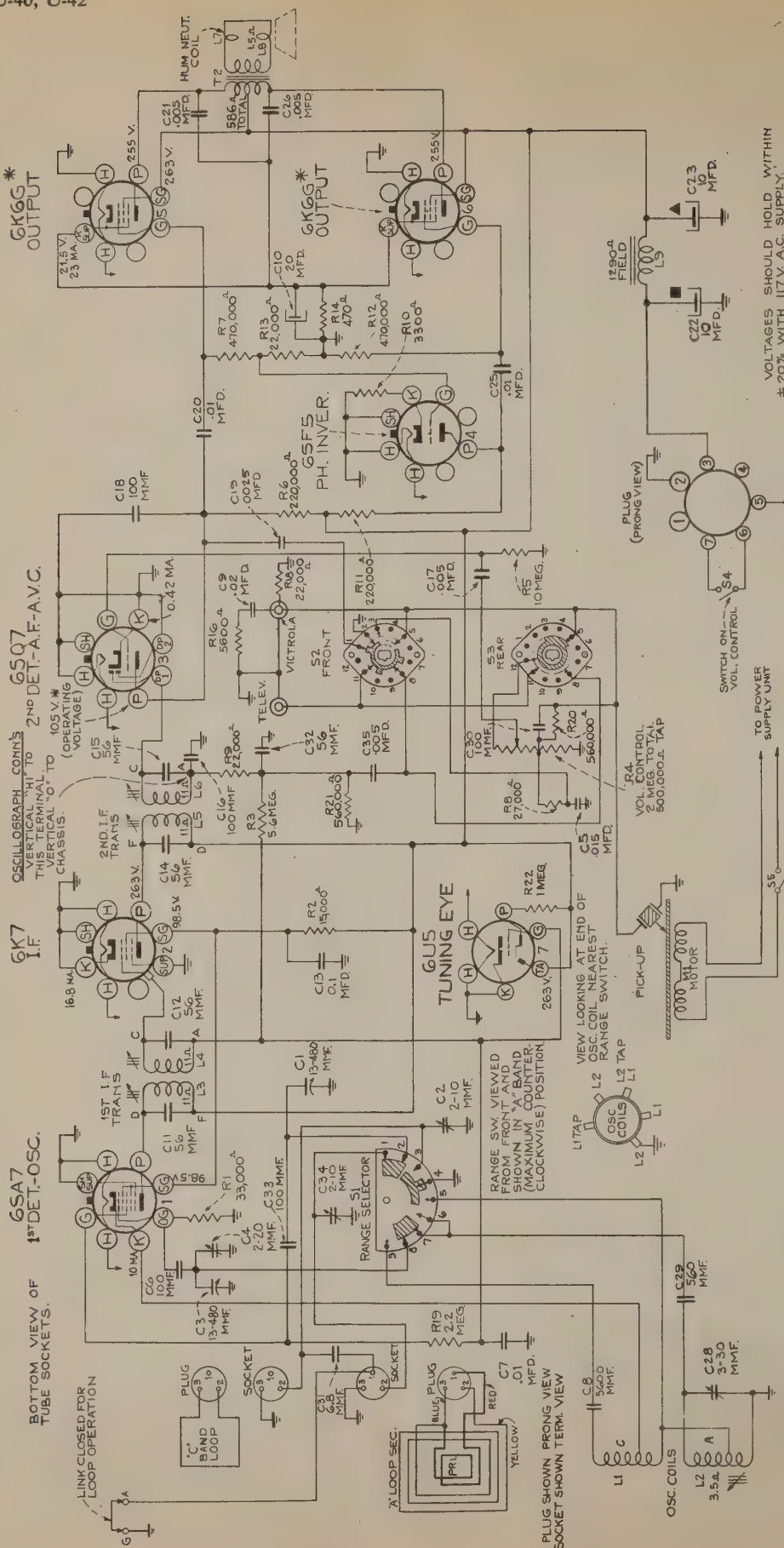
6. Insert the station marker tabs in the recesses adjacent to the push-buttons.



U-42 S.P.U.

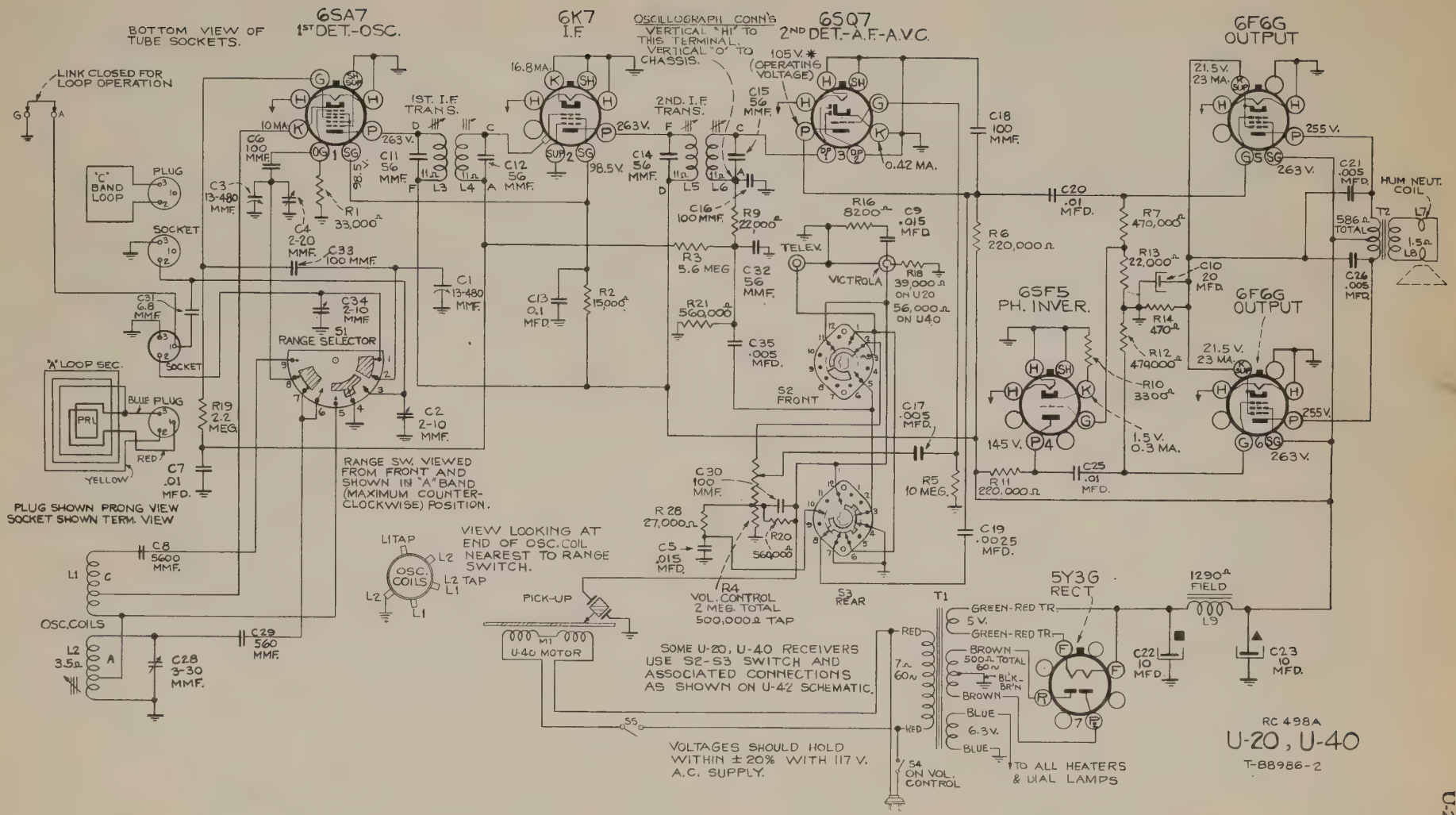
Antennas

Each of these receivers is equipped with two loop antennas ("C" band horizontal and fixed, and "A" band vertical and rotatable). During installation the "A" band loop should be rotated to the position giving maximum signal strength and freedom from noise. If desired, an outside antenna and ground can be connected to the terminals provided and when this is done the link between these terminals must be opened. However for loop operation this link must be closed.



U-42 Schematic

* Note.—Some U-42 instruments employ 6F6G output tubes. Both types are interchangeable. On some Models U-42, R18 is 27,000 ohms.



U-20 and U-40 Schematic

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
33719	Belt—Push button station setting belt (Models U-40, U-42)
34724	Board—"Antenna-Ground" board
30766	Cap—Rubber cap for "Magic Eye" (Model U-42)
34725	Capacitor—Trimmer comprising 1 section of 3-30 mmfd. and 2 sections of 2-10 mmfd. (Models U-20, U-42) (C2, C4, C28)
34852	Capacitor—Trimmer comprising 1 section of 3-30 mmfd. and 2 sections of 2-10 mmfd. (Model U-40) (C2, C4, C28)
14079	Capacitor—6.8 mmfd. (C31)
12723	Capacitor—56 mmfd. (C32)
30949	Capacitor—56 mmfd. (C11, C12, C14, C15)
12720	Capacitor—100 mmfd. (C6, C16, C18, C30, C33)
12537	Capacitor—560 mmfd. (C29)
13895	Capacitor—5,600 mmfd. (C8)
34459	Capacitor—.0025 mfd. (C19)
33584	Capacitor—.005 mfd. (C17, C21, C35)
4937	Capacitor—.01 mfd. (C7, C20, C25)
11315	Capacitor—.015 mfd. (C5, C9) (C9 Models U-20 and U-40 only)
32785	Capacitor—.02 mfd. (C9) model U-42 only
4839	Capacitor—0.1 mfd. (C13)
32240	Capacitor—Electrolytic comprising 2 sections of 10 mfd. and 1 section of 20 mfd. (C10, C22, C23)
34285	Clip—"Magic Eye" clip (Model U-42)
32707	Coil—Oscillator coil (L1, L2)
34721	Control—Volume control and power switch (R4, S4)
32634	Cord—Tuning condenser drive cord
32713	Core—Adjustable core and stud for oscillator coil (Models U-20, U-42)
34853	Core—Adjustable core and stud for oscillator coil (Model U-40)
33633	Indicator—Station selector indicator
34407	Plate—Dial plate less condenser (Models U-40, U-20)
34798	Plate—Dial plate complete less tuner and push button (Model U-42)
30868	Plug—2-contact female plug for motor lead (Models U-20, U-40)
5040	Plug—4-contact female plug for speaker leads
14404	Plug—7-contact female plug for battery cable (Model U-42)
30546	Resistor—470 ohms, ½ watt (R14)
12312	Resistor—3,300 ohms, ½ watt (R10)
13714	Resistor—5,600 ohms, ½ watt (R16) (Model U-42 only)
14075	Resistor—8,200 ohms, ½ watt (R16) (Model U-20 and U-40 only)
13998	Resistor—22,000 ohms, ½ watt (R9, R13)
12738	Resistor—27,000 ohms, ½ watt (R8, R18) (some models U-42 only)
12454	Resistor—33,000 ohms, ½ watt (R1)
12266	Resistor—39,000 ohms, ½ watt (R18) (Model U-20 only)
12286	Resistor—56,000 ohms, ½ watt (R18) (Model U-40 only)
12264	Resistor—220,000 ohms, ½ watt (R6, R11)
12285	Resistor—470,000 ohms, ½ watt (R7, R12)
12486	Resistor—560,000 ohms, ½ watt (R20, R21)
12013	Resistor—1 megohm, 1/10 watt (R22) (U-42 only)
12679	Resistor—2.2 megohm, ½ watt (R19)
11668	Resistor—5.6 megohm, ½ watt (R3)
13601	Resistor—10 megohm, ½ watt (R5)
33735	Screw—Push arm adjusting screw
34411	Shaft—Tuning condenser drive shaft
31364	Socket—Dial lamp socket
34799	Socket—"Magic Eye" socket (Model U-42)
33514	Socket—Phonograph input socket
31319	Socket—Tube socket
34726	Spring—Push arm return spring .018 dia. wire.
33720	Spring—Push arm return spring (Model U-42).
34720	Switch—Radio, Phono, Television, Tone switch (S2, S3)
34722	Switch—Range switch (S1)
32263	Transformer—1st i.f. transformer (L3, L4, C11, C12)
34719	Transformer—2nd i.f. transformer (L5, L6, C14, C15)
33726	Washer—Retaining washer for shaft, Stock No. 34411
	PICKUP AND ARM ASSEMBLIES U-20
33906	Arm—Pickup arm—shell only
33908	Base—Pickup support arm base and retainer
33905	Crystal—Pickup crystal cartridge
33907	Support—Pickup support arm complete — less base

STOCK No.	DESCRIPTION
	MOTOR ASSEMBLIES U-20
34416	Arm—Drive wheel support arm (long)
34415	Arm—Idler wheel support arm (short)
34516	Armature—Motor armature complete
34515	Bushing—Motor mounting rubber bushings
34413	Capacitor—1.25 mfd., 60 cycle motor starting capacitor for motor, Stock No. 34412 (C35).
34514	Cover—Bakelite top end shell for motor
34414	Idler—Rubber tired idler or drive wheel
34412	Motor—105-125 volt, 60 cycle phono. motor—less pulleys, capacitor and motor cradle (M1).
34418	Plate—Motor support plate complete with turntable bearing
14887	Retainer—Idler wheel retainer spring
34437	Spindle—Turntable spindle
34417	Spring—Idler arm tension spring
	AUTOMATIC SWITCH ASSEMBLIES U-20
34419	Base—Pickup arm mounting base
32865	Bracket—Switch bracket and terminal board
34308	Cam—Switch cam assembly with spring
32864	Lever—Switch actuating lever, roller, and clip.
34309	Mounting—Pickup arm base mounting (rubber grommet, washers, and nut)
34311	Ring—Retaining ring for pickup arm pivot shaft
14195	Screw—No. 10-32 x 5/16 set screw for switch cam hub
34314	Shaft—Pickup arm pivot shaft—for crystal pick-up
34310	Spool—Insulating spool for switch leads
32868	Spring—Switch lever spring
32867	Spring—Tension spring for switch cam
32866	Switch—Mercury tube and leads (S5)
31608	Washer—Retaining washer for switch lever
	POWER SUPPLY ASSEMBLIES U-42
30868	Plug—2-contact female plug for motor leads
14409	Plug—7-contact plug for power supply cable
31319	Socket—Tube socket
32144	Transformer—Power transformer, 105-120 volts, 50-60 cycles
	SPEAKER ASSEMBLIES (RL-70K1)
31825	Cap—Dust cap
34705	Cone—Cone complete with voice coil (L8)
34728	Diffuser—Speaker diffuser
5039	Plug—4-prong speaker plug
34727	Speaker—12-inch dynamic complete with cone and voice coil—less output transformer and plug
33444	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
33731	Button—Push button
33730	Clamp—Dial clamp (Model U-20)
31456	Cover—Protective cover for markers (Models U-20, U-42)
33910	Cup—Needle cup (Model U-20)
33909	Cup—Used needle cup (Model U-20)
34730	Dial—Glass dial scale (Models U-40, U-20)
34867	Dial—Glass dial scale (Model U-42)
34420	Escutcheon—Dial scale and push button escutcheon
34583	Frame—"C" band antenna loop frame
34792	Gasket—Rubber gasket for motorboard (Model U-42)
30698	Hinge—Lid hinge (Model U-20)
34871	Hinge—Door hinge—L.H. for 1 door (Model U-42)
34870	Hinge—Door hinge—R.H. for 1 door (Model U-42)
13103	Jewel—Pilot lamp jewel (Models U-40, U-42)
33434	Knob—Tuning tone control, range switch or volume control and power switch knob
31480	Lamp—Dial lamp (Model U-42)
34800	Loop—"A" band loop antenna (Model U-20).
34729	Loop—Antenna loop (Model U-40)
34868	Loop—Antenna loop for "A" band (Model U-42)
33973	Marker—Station selector push button markers (Model U-20)
34866	Marker—Station markers (Model U-42)
34872	Pin—Complete set of dowel pins for antenna loop (Model U-42)
30870	Plug—2-prong male connector for motor lead (Model U-20)
32641	Plug—3-prong plugs for antenna loops (Model U-20)
32641	Plug—3-prong male plug for loops (Models U-40, U-42)
31048	Plug—Phono plug for pickup lead (Model U-20)
34869	Pull—Door pull (Model U-42)
35172	Rubber—Sponge rubber strip for doors
32870	Screen—Compartment lamp screen (Models U-40, U-42)
31364	Socket—Dial lamp socket (Model U-42)
14270	Spring—Retaining spring for knob, Stock No. 33434
31470	Spring—Motorboard spring mounting hardware (Models U-40, U-42)
30900	Spring—Retaining spring for button, Stock No. 33731
34423	Support—Lid support (Model U-20)
34422	Turntable—Phonograph turntable less spindle (Model U-20)

RCA Victor

VICTROLA MODELS U-25 and U-26

Chassis No. RC-386B

Eight-Tube, Three-Band, Electric-Tuning, A-C, Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 38 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

"Standard Broadcast" (A)	540-1,720 kc	"Medium Wave" (B)	2.3-7.0 mc
		"Short Wave" (C)	7.0-22 mc

Six Electric Tuning Positions ..... 550-1,500 kc

2 stations between approximately 550- 950 kc
2 stations between approximately 690-1,225 kc
2 stations between approximately 890-1,500 kc

Intermediate Frequency ..... 455 kc

RCA TUBE COMPLEMENT

(1) RCA-6A8-G	First Detector—Oscillator	(5) RCA-6K6-G	Power Output
(2) RCA-6K7	Intermediate-Frequency Amplifier	(6) RCA-6K6-G	Power Output
(3) RCA-6Q7-G	Second Detector, 1st A-F, and A.V.C.	(7) RCA-6U5	"Magic Eye" Tuning Indicator
(4) RCA-6J5	Phase Inverter	(8) RCA-5Y3-G	Rectifier

Pilot Lamps (4) ..... 1 Mazda 44, 6.3 volts, 0.25 amp.; 3 Mazda 47, 6.3 volts, 0.15 amp.

POWER SUPPLY RATINGS

A-6	105-125 volts,	60 cycles,	115 watts
A	105-125 volts,	50-60 cycles,	115 watts
B-2	105-125 volts,	25 cycles,	115 watts
C-6	100-130/140-160/200-250 volts,	60 cycles,	115 watts
C	100-130/140-160/200-250 volts,	50-60 cycles,	115 watts

POWER OUTPUT

Undistorted	5 watts
Maximum	5.5 watts

LOUDSPEAKER (RL-70-H5)

Type	12-inch Electrodynamic
Voice Coil Impedance	2.2 ohms at 400 cycles

PHONOGRAPH

Type	Automatic
Record Capacity	Eight 10-inch or seven 12-inch
Turntable Speed	78 r.p.m. adjustable

PICKUP

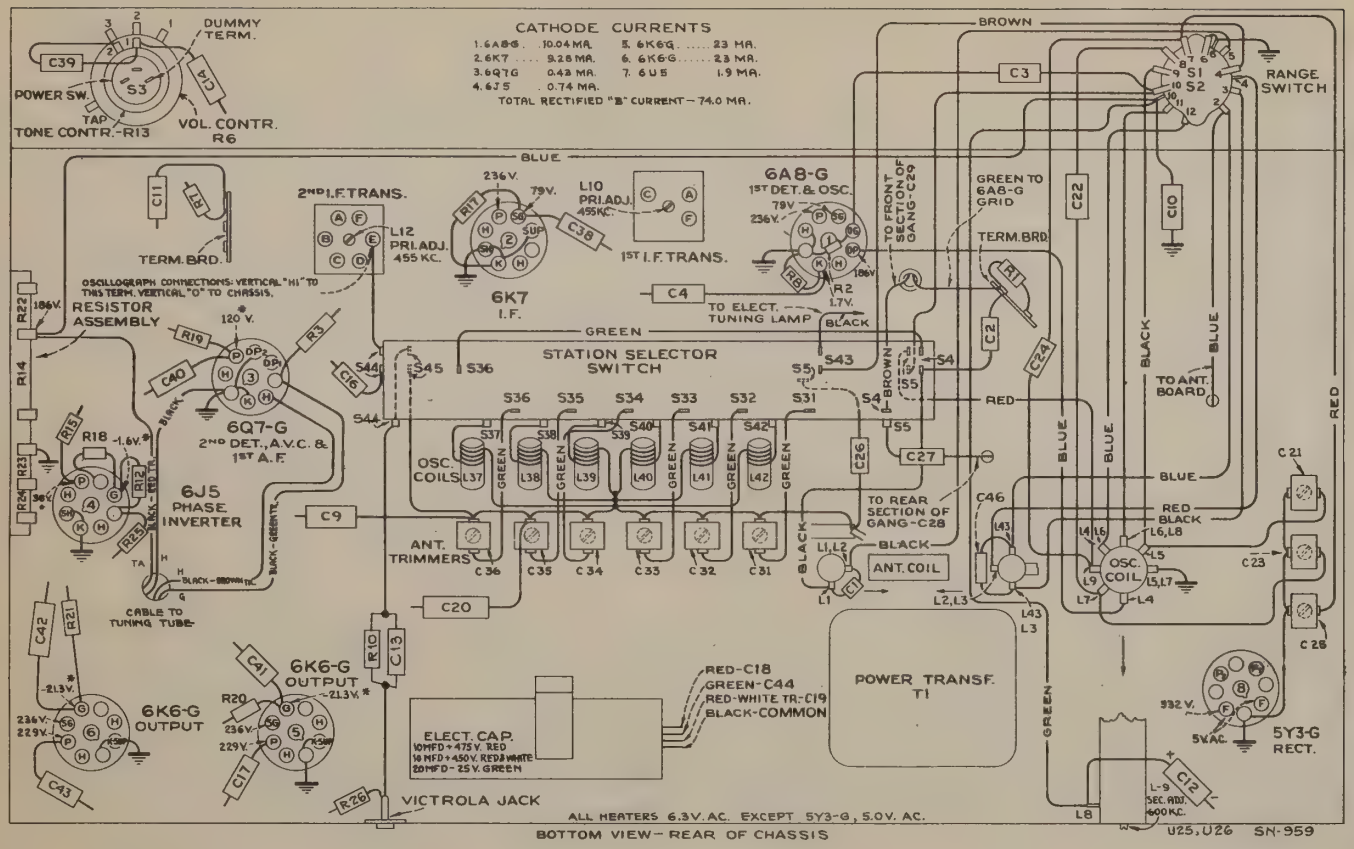
Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Average Output	1.5 volts at 1,000 cycles across 500,000 ohm load

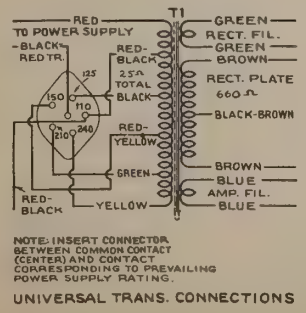
Mechanical Specifications

	Model U-25	Model U-26
Height	34 inches	35 inches
Width	30½ inches	33½ inches
Depth	16¾ inches	16¾ inches
Net Weight	83 pounds	93½ pounds
Shipping Weight	102 pounds	121½ pounds

Chassis Base Dimensions	13 in. x 6½ in. x 2½ in.
Over-all Chassis Height	6½ inches
Tuning Drive Ratio	12 to 1

First Edition **Trademarks** "Victrola" "RCA Victor" "Magic Eye" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc. Printed in U.S.A.





NOTE: INSERT CONNECTOR BETWEEN COMMON CONTACT (CENTER) AND CONTACT CORRESPONDING TO PREVAILING POWER SUPPLY RATING.

UNIVERSAL TRANS. CONNECTIONS

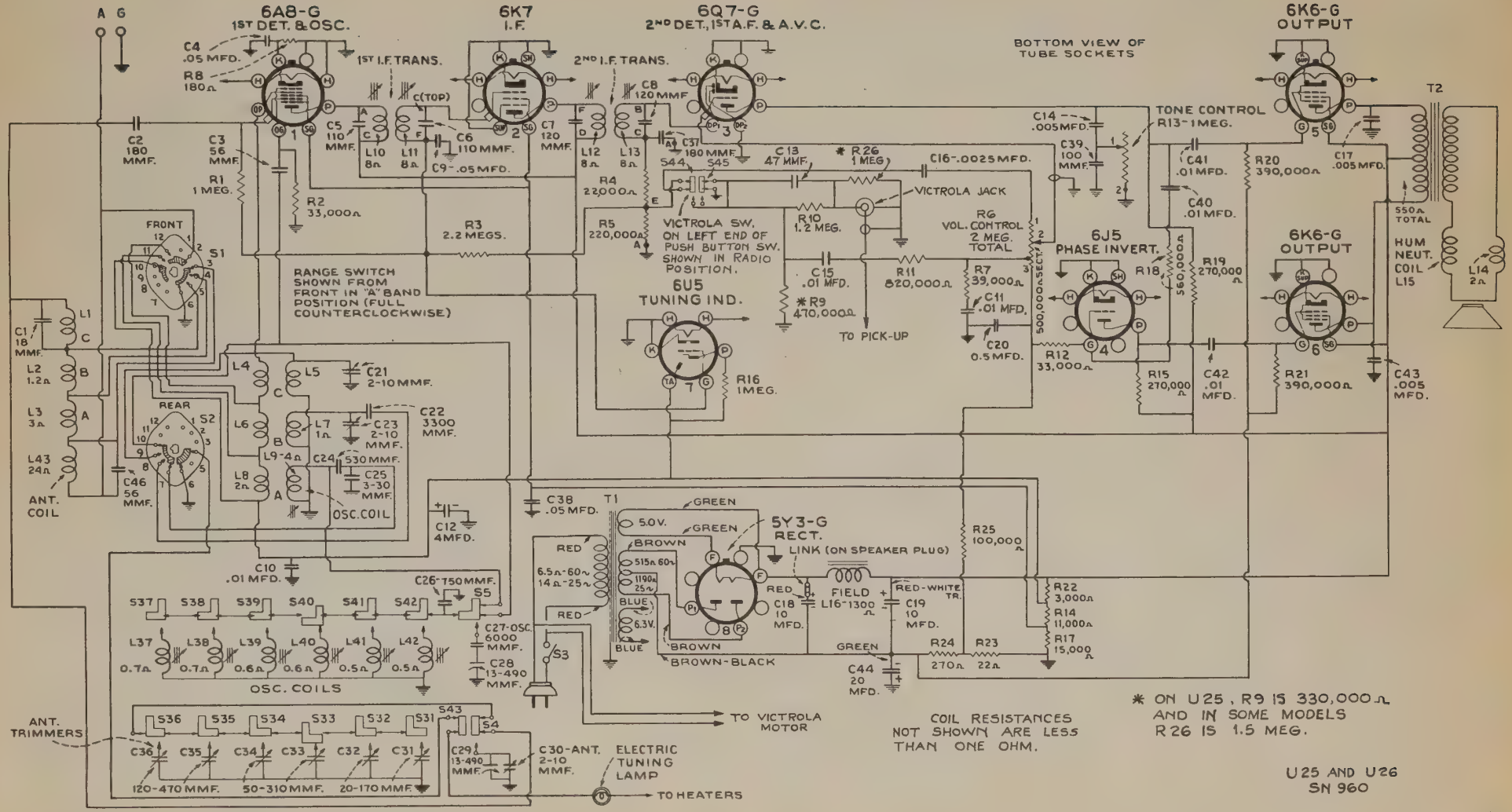
R-F Wiring Diagram and Socket Voltages

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ±20% with 117-volt a-c supply.

* **NOTE:** Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.

Model U-26

Model U-25


A G
6A8-G
1ST DET. & OSC.
6K7
I.F.
6Q7-G
2ND DET., 1ST A.F. & A.V.C.
6K6-G
OUTPUT
BOTTOM VIEW OF TUBE SOCKETS
1ST I.F. TRANS.
2ND I.F. TRANS.
C4 .05 MFD.
R8 180Ω
C2 180 MMF.
C3 56 MMF.
R1 1 MEG.
R2 33,000Ω
C5 110 MMF.
C6 110 MMF.
C9-.05 MFD.
L10 8Ω
L11 8Ω
L12 8Ω
L13 8Ω
C7 120 MMF.
C8 120 MMF.
C37 180 MMF.
R4 22,000Ω
R5 220,000Ω
S44 S45
VICTROLA SW. ON LEFT END OF PUSH BUTTON SW. SHOWN IN RADIO POSITION.
C13 47 MMF.
* R26 1 MEG.
C16-.0025 MFD.
VICTROLA JACK
R10 1.2 MEG.
R6 VOL. CONTROL 2 MEG. TOTAL
C15 .01 MFD.
R11 820,000Ω
R7 39,000Ω
C11 .01 MFD.
* R9 470,000Ω
TO PICK-UP
C20 0.5 MFD.
6U5 TUNING IND.
R16 1MEG.
C14 .005 MFD.
TONE CONTROL R13-1 MEG.
C39 100 MMF.
C41 .01 MFD.
C40 .01 MFD.
R20 390,000Ω
C17 .005 MFD.
T2
550Ω TOTAL
HUM NEUT. COIL L15
L14 2Ω
6J5 PHASE INVERT.
R18 500,000Ω
R19 270,000Ω
R12 33,000Ω
R15 270,000Ω
C42 .01 MFD.
R21 390,000Ω
C43 .005 MFD.
FRONT
REAR
S1
S2
RANGE SWITCH SHOWN FROM FRONT IN 'A' BAND POSITION (FULL COUNTERCLOCKWISE)
C1 18 MMF.
L1
L2 1.2Ω
L3 3Ω
L43 24Ω
C46 56 MMF.
ANT. COIL
L4
L5
C21 2-10 MMF.
L6
L7 1Ω
C23 2-10 MMF.
C22 3300 MMF.
L9-4Ω
C24 530 MMF.
C25 3-30 MMF.
L8 2Ω
OSC. COIL
C12 4MFD.
C10 .01 MFD.
C38 .05 MFD.
T1
5.0V.
6.5Ω-60~ 14Ω-25~
515Ω 60~
1190Ω 25~
6.3V.
5Y3-G RECT.
LINK (ON SPEAKER PLUG)
R25 100,000Ω
C18 10 MFD.
FIELD L16-1300Ω
C19 10 MFD.
R22 3,000Ω
R14 11,000Ω
R17 15,000Ω
R24 270Ω
R23 22Ω
C44 20 MFD.
C26-750 MMF.
S5
S37 S38 S39 S40 S41 S42
L37 L38 L39 L40 L41 L42
0.7Ω 0.7Ω 0.6Ω 0.6Ω 0.5Ω 0.5Ω
OSC. COILS
C27-OSC. 6000 MMF.
C28 13-490 MMF.
S3
TO VICTROLA MOTOR
ANT. TRIMMERS
S36 S35 S34 S33 S32 S31 S43 S4
C36 C35 C34 C33 C32 C31
120-470 MMF. 50-310 MMF. 20-170 MMF.
C29 13-490 MMF.
C30-ANT. 2-10 MMF.
ELECTRIC TUNING LAMP
TO HEATERS
COIL RESISTANCES NOT SHOWN ARE LESS THAN ONE OHM.
* ON U25, R9 IS 330,000Ω AND IN SOME MODELS R26 IS 1.5 MEG.
U25 AND U26 SN 960

GENERAL INFORMATION

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc. are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and revolving the turntable by hand. Six turntable revolutions are required for one change cycle.

The turntable, spindle, and pinion gear are assembled by means of a 3/32 inch straight pin. This pin may be removed by gently driving with a standard pin punch.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

The 10 and 12 inch records must be absolutely flat for smooth operation when using a mixture of the two sizes.

A shorting switch, located in the pickup head, operates due to pressure when the pickup is placed on the pickup rest.

ADJUSTMENTS

A. Main Lever.—This lever is basically important in that it interlinks the various individual mechanisms which control needle landing, tripping, record separation, etc. One adjustment is provided for the main lever. Rotate the turntable until the changer is out-of-cycle; and adjust rubber bumper bracket (A) so that the roller clears the nose of the cam plate by 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the record is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pickup is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the trip finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.

C. Pickup Lift Cable Screw.—During the record change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pickup lift cable. To adjust pickup for proper elevation, stop the changer "in-cycle" at the point where pickup is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknuts "C" to obtain 1 inch spacing between needle point and turntable top surface.

D. & E. Needle Landing on Record. — The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10 inch record. Position of eccentric stud "E" governs the landing of the needle on a 12 inch record; this, however, is dependent on the proper 10 inch adjustment.

To adjust for needle landing, place 10 inch record on turntable; push index lever to reject position and return to the 10 inch position; see that pickup locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on the record; then see that pin "V" on lever "14" is in contact with "Step T" on lever "17." The correct point of landing is 4-11/16 inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17". Leave approximately 1/32 inch end play between hub of lever "20" and pickup base bearing, and tighten the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone pointed screw "D".

After adjusting for needle landing on a 10 inch record, place 12 inch record on turntable; push index lever to reject and return to 12 inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5-11/16 inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be toward the rear of the motor board, otherwise incorrect landing may occur with 10 inch records.

F. & G. Record Separating Knife. — The upper plate (knife) "25" on each of the record posts serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "27" be accurately maintained. The spacing for the 10 inch record is nominally .058 inch, and for the 12 inch record is .075 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "F" to give .055—.061 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F" adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072—.078 inch.

H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustments be such that the record is released from both shelves at the same instant. To adjust, place a 12 inch record on the turntable, rotate mechanism into cycle to the point where tone arm is at maximum distance outward from turntable; lift record upward until it is in contact with both separating knives, then loosen screws "H" and shift record shelves so that the curved inner edges of the shelves are uniformly spaced at least 1/16 inch from record edge. Tighten the blunt nose screw "H," run mechanism through cycle several times to check action, then tighten cone pointed screw "H".

If record shelves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown).—When the changer is out-of-cycle, the front lower edge of the pickup head should be 5/16 inch above surface of motor board. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication.—Petrolatum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motor board.

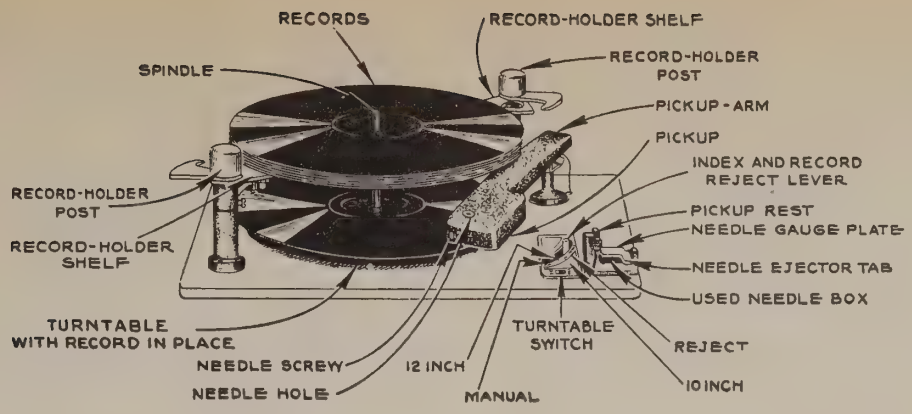
The felt washer between the turntable and spindle bearing should be soaked in light engine oil whenever the turntable is removed, or as required for proper operation.

Do not allow oil or grease to come in contact with, rubber mounting of tone arm base, rubber bumper, or flexible coupling of drive motor.

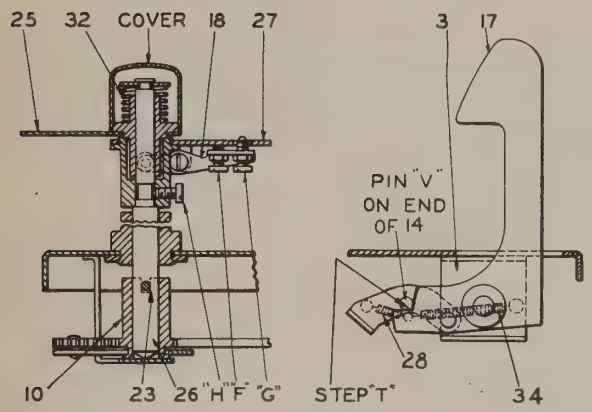
MISCELLANEOUS SERVICE HINTS

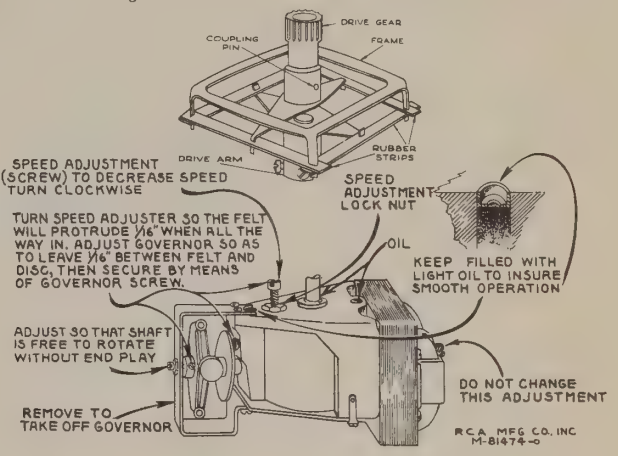
Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual mis-adjustments will enable ready adjustment in most cases.

1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A".
2. Needle does not land properly on both 10 and 12 inch records—Make complete adjustments "D" and "E".
3. Needle does not land properly on 12 inch record but correct on 10 inch—Effect adjustment "E".
4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B". Also, see that levers "7" and "12" are free to move without touching each other.
5. Pickup strikes lower record of stack or drags across top record on turntable—Adjust lift cable per adjustment "C".
6. Needle does not track after landing—Friction clutch "5" adjustment "B" may be too tight; bind in tone arm vertical bearing; levers "7" and "12" fouled; or pickup output cable twisted.
7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.
8. Wow in record reproduction—Record is defective; flexible coupling between motor and changer mechanism not correctly assembled; or instrument is not being operated at normal room temperature (65° F).
9. Record knives strike edge of records—Records warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.
10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H".
11. Needle lands in 10 inch position on 12 inch record or misses record when playing both types mixed—Increase tension of pickup locating lever spring "34".

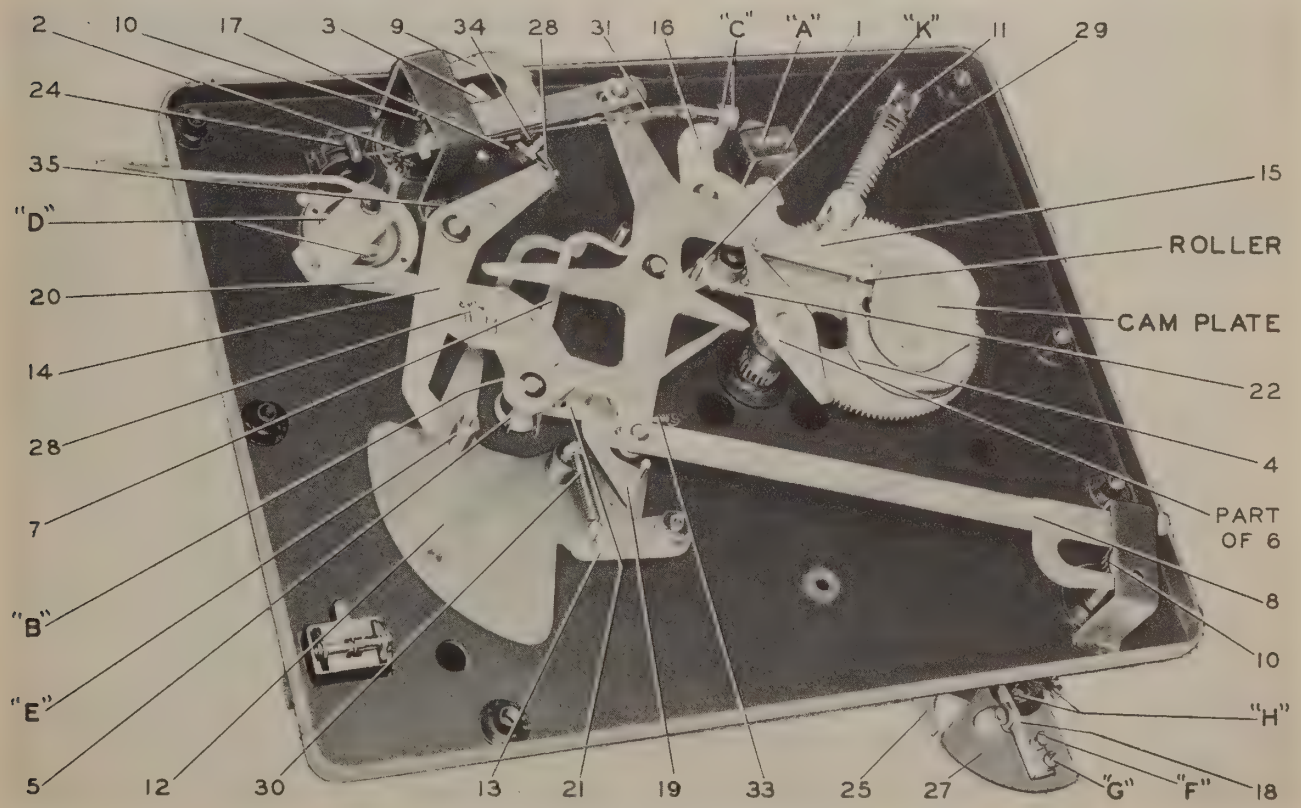


Top View of Automatic Record Changer




DRIVE GEAR
COUPLING PIN
FRAME
RUBBER STRIPS
DRIVE ARM
SPEED ADJUSTMENT (SCREW) TO DECREASE SPEED TURN CLOCKWISE
SPEED ADJUSTMENT LOCK NUT
TURN SPEED ADJUSTER SO THE FELT WILL PROTRUDE 1/16" WHEN ALL THE WAY IN. ADJUST GOVERNOR SO AS TO LEAVE 1/16" BETWEEN FELT AND DISC, THEN SECURE BY MEANS OF GOVERNOR SCREW.
OIL
KEEP FILLED WITH LIGHT OIL TO INSURE SMOOTH OPERATION
ADJUST SO THAT SHAFT IS FREE TO ROTATE WITHOUT END PLAY
DO NOT CHANGE THIS ADJUSTMENT
REMOVE TO TAKE OFF GOVERNOR
R.C.A. MFG. CO. INC. M-81474-0

Details of Record Shelf Posts, and Locating Lever Assemblies



Bottom View of Automatic Record Changer

NOTE: Numbers refer to parts—letters refer to adjustments.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The distance from the front of the chassis to the drum must not exceed ⅜-inch. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

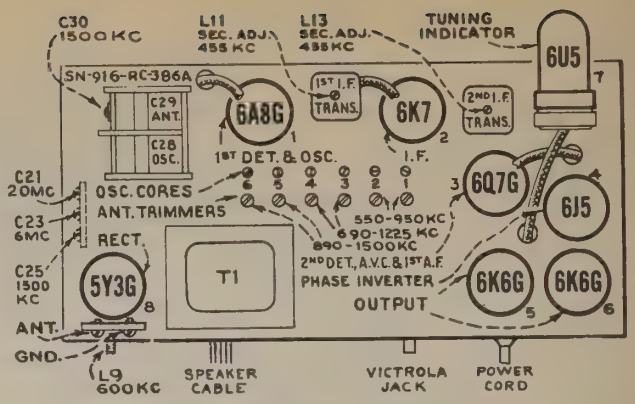
Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio-dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	"A" band, Quiet Point between 550-750 kc	L12 and L13 (2nd I-F Transformer)
2	6A8G det. grid cap, in series with .01 mfd.	455 kc		L10 and L11 (1st I-F Transformer)
3	Antenna Terminal, in series with 200 mmf.	600 kc	600 kc (150.5°) "A" band	L9
4		1,500 kc	1,500 kc (28°) "A" band	C25 (osc.) C30 (ant.)
5	Repeat steps 3 and 4.			
6	Antenna Terminal, in series with 400 ohms.	6 mc	6 mc (26.5°) "B" band	C23 (osc.)*
7		20 mc	20 mc (22°) "C" band	C21 (osc.)*
8	Follow "Adjustments for Electric Tuning."			

*Use minimum capacity peak if two peaks can be obtained, and rock gang condenser slightly while adjusting C23 and C21.

Note.—Oscillator tracks 455 kc above signal on all bands.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, move the dial indicator on the drive cable to the left-hand end mark on dial, with gang condenser fully meshed.

For additional details, refer to booklet "RCA Victor Receiver Alignment."



Tube and Trimmer Locations

Adjustments for Electric Tuning

These models have eight push buttons. The left-hand button is a Victrola switch. The right-hand button connects the gang condenser for manual tuning. The other six buttons are for electric tuning of six different stations in the standard-broadcast range. The station buttons connect to separate magnetite-core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31031. Allow at least five minutes warm-up period before making adjustments.

The procedure is as follows:

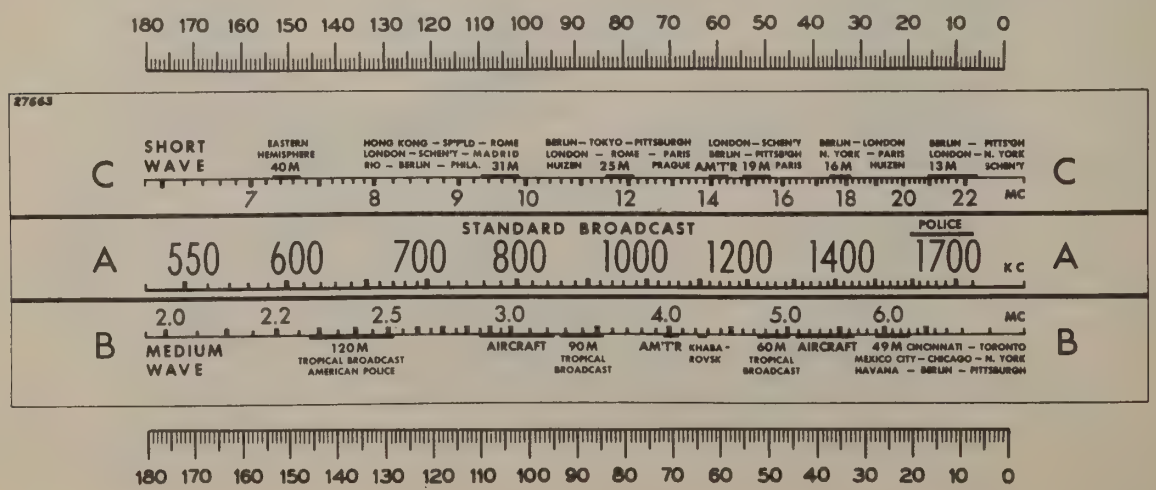
1. Make a list of the desired six stations, arranged in order from low to high frequencies.
2. Push in the dial-tuning button, and manually tune in the first station on the list.
3. Push in station button No. 1 (second from left) and adjust No. 1 oscillator core (L37) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until station is received.
4. Adjust No. 1 antenna trimmer (C36) for maximum output on this station.

Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.

5. Adjust for each of the remaining five stations in the same manner.
6. Make a final careful adjustment of the oscillator cores and antenna trimmers.

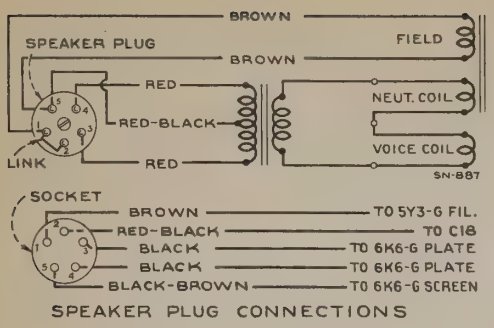
Precautionary Lead Dress.—

1. Dress red leads from power transformer to power switch (S3), in corner of chassis and away from volume control terminals.
2. Dress brown lead from push-button switch to gang over end of switch, and away from C27 and bus between S5 and range switch.
3. Leads to C27 must be as short as possible.
4. Blue lead from range switch to oscillator coil must be as short as possible and dressed away from other leads. All leads should be dressed away from antenna coil.
5. Leads across back of chassis must be dressed under electrolytic away from Victrola jack.
6. Parts and leads should be dressed away from R22-R14 as it becomes heated.
7. Leads from oscillator coil to trimmers must be dressed away from coil.
8. Green lead from S4 to range switch must be clear of other leads and away from front edge of chassis.

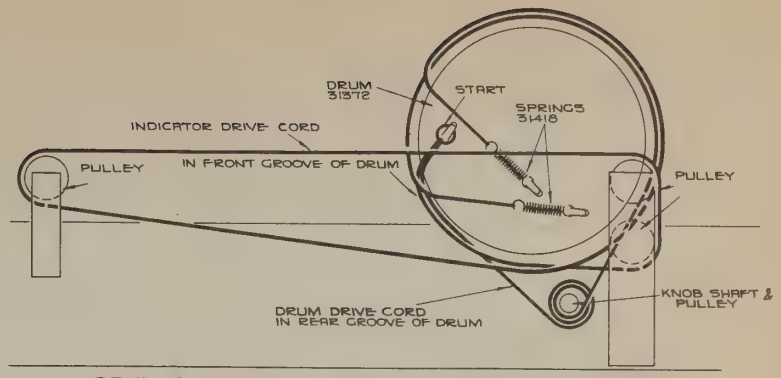

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
27663
C
SHORT WAVE
EASTERN HEMISPHERE 40M
HONG KONG – SP'FLD – ROME LONDON – SCHEN'Y – MADRID RIO – BERLIN – PHILA. 31M
BERLIN – TOKYO – PITTSBURGH LONDON – ROME – PARIS HUIZEN 25M PRAGUE
LONDON – SCHEN'Y BERLIN – PITTSBURGH AM'T'R 19M PARIS
BERLIN – LONDON N. YORK – PARIS 16M HUIZEN
BERLIN – PITTS'GH LONDON – N. YORK 13M SCHEN'Y
7 8 9 10 12 14 16 18 20 22 MC
STANDARD BROADCAST
POLICE
A
550 600 700 800 1000 1200 1400 1700 KC
2.0 2.2 2.5 3.0 4.0 5.0 6.0 MC
B
MEDIUM WAVE
120M TROPICAL BROADCAST AMERICAN POLICE
AIRCRAFT
90M TROPICAL BROADCAST
AM'T'R KHABA-ROVSK
60M TROPICAL BROADCAST
AIRCRAFT
49M CINCINNATI – TORONTO MEXICO CITY – CHICAGO – N. YORK HAVANA – BERLIN – PITTSBURGH
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

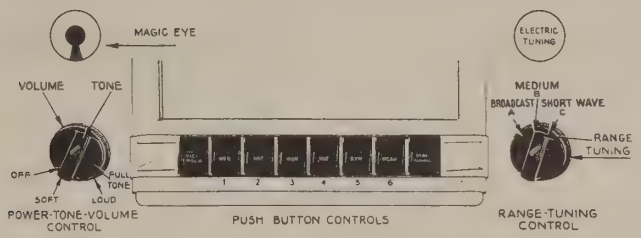
The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example; 28° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."



SPEAKER PLUG CONNECTIONS



DRUM SHOWN WITH GANG AT MAXIMUM CAPACITY



REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily indentified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-386-B)
14517	Board—Antenna ground terminal board
30752	Bracket—Magic Eye mounting bracket
31400	Capacitor—Triple adjustable trimmer, two sections 2-10 mmfd., one section 3-30 mmfd. (C21, C23, C25)
32486	Capacitor—Antenna coil trimmer capacitor bank 20-470 mmfd. (C31, C32, C33, C34, C35, C36)
12722	Capacitor—18 mmfd. (C1)
13141	Capacitor—47 mmfd. (C13)
12723	Capacitor—56 mmfd. (C3, C46)
12720	Capacitor—100 mmfd. (C39)
14262	Capacitor—109 mmfd. (C5, C6)
12404	Capacitor—120 mmfd. (C7, C8)
13003	Capacitor—180 mmfd. (C37)
14712	Capacitor—180 mmfd. (C2)
32492	Capacitor—530 mmfd. (C24)
31435	Capacitor—750 mmfd. (C26)
4881	Capacitor—3,300 mmfd. (C22)
31405	Capacitor—6,000 mmfd. (C27)
5107	Capacitor—.0025 mfd. (C16)
4838	Capacitor—.005 mfd. (C14, C17, C43)
4858	Capacitor—.01 mfd. (C10, C40, C41, C42)
14393	Capacitor—.01 mfd. (C11, C15)
30882	Capacitor—.05 mfd. (C4, C9, C38)
30867	Capacitor—0.5 mfd. (C20)
32145	Capacitor—4 mfd. (C12)
32142	Capacitor—Comprising two 10 mfd., one 20 mfd. sections (C18, C19, C44)
31382	Clip—Oscillator coil and core mounting clip
32493	Coil—Antenna coil—A, B, and C bands (L1, L2, L3, L43)
31951	Coil—Oscillator coil—A, B, and C bands (L4, L5, L7, L9)
31383	Coil—Oscillator coil—A band (L41, L42)
32487	Coil—Oscillator coil— A band (L39, L40)
31385	Coil—Oscillator coil—A band (L37, L38)
31369	Condenser—2-gang variable tuning condenser (C28, C29, C30)
31366	Control—Volume control, tone control, and on-off switch (R6, R13, S3)
32635	Cord—Indicator pointer drive cord
32634	Cord—Variable condenser drum drive cord
30905	Core—Adjustable core and stud for i-f transformer
31386	Core—Adjustable core and stud for oscillator coil, Stock Nos. 31383, 32487, and 31385
12800	Core—Adjustable core for oscillator coil, Stock No. 31951
31372	Drum—Variable condenser drive cord drum and calibration dial
11891	Lamp—Phono. compartment lamp
31480	Lamp—Dial and "Electric Tuning" lamp
30868	Plug—2-contact female plug for motor cable
5040	Plug—4-contact female plug for speaker cable.
31373	Pulley—Drive cord pulley
32143	Resistor—Voltage divider comprising one 11,000 ohm, one 3,000 ohm, one 22 ohm, and one 270 ohm sections (R14, R22, R23, R24)
30545	Resistor—180 ohms, ½ watt (R8)
5114	Resistor—15,000 ohms, 1 watt (R17)
14284	Resistor—22,000 ohms, 1/10 watt (R4)
12454	Resistor—33,000 ohms, ½ watt (R2, R12)
12266	Resistor—39,000 ohms, ½ watt (R7)
14560	Resistor—100,000 ohms, ½ watt (R25)
11398	Resistor—220,000 ohms, 1/10 watt (R5)
12199	Resistor—270,000 ohms, ½ watt (R15, R19)
14983	Resistor—330,000 ohms, ½ watt (R9)
13479	Resistor—390,000 ohms, ½ watt (R20, R21)
12486	Resistor—560,000 ohms, ½ watt (R18)
30963	Resistor—820,000 ohms, ½ watt (R11)
12013	Resistor—1 meg., 1/10 watt (R16)
13730	Resistor—1 meg., ½ watt (R1, R26)
30208	Resistor—1.2 meg., ½ watt (R10)
12679	Resistor—2.2 meg., ½ watt (R3)
14343	Retainer—Retaining spring for station selector knob shaft
14887	Retainer—Drive cord pulley retainer
4669	Screw—No. 8-32 square head set screw for drum, Stock No. 31372
31368	Shaft—Station selector knob shaft and pulley
3682	Shield—Tube shield
30868	Socket—2-contact female socket for motor power cable
12493	Socket—5-contact female socket for speaker cable
13871	Socket—Magic Eye socket
14278	Socket—Pickup input socket
31251	Socket—Tube socket
31418	Spring—Indicator or drum drive cord tension spring
32491	Switch—Range switch (S1, S2)
32498	Switch—Station selector push-button switch and Radio-Record switch (S4, S5, S31, S32, S33, S34, S35, S36, S37, S38, S39, S40, S41, S42, S43, S44, S45)
14376	Transformer—First i-f transformer (L10, L11, C5, C6)
14283	Transformer—Second i-f transformer (L12, L13, C7, C8, C37, R4, R5)

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
31445	Transformer—Power transformer 105-125 volts, 25-60 cycles (T1)
31446	Transformer—Power transformer 100-130/140-160/200-250 volts, 50-60 cycles (T1)
32144	Transformer—Power transformer 105-125 volts, 50-60 cycles (T1)
	OPERATING MECHANISM
31134	Bracket—Pickup locating lever mounting bracket (3)
32878	Cam—Cam and gear assembly (4)
6808	Clutch—Trip lever friction clutch assembly (5)
31146	Coupling—Motor coupling complete with turntable drive gear, rubber strips, motor coupling, and drive arm (6)
31129	Cover—Cap for top of record post
31116	Finger—Trip lever friction finger assembly (7)
31119	Gear—Long arm and rack gear for front left-hand record post (8)
31120	Gear—Short arm and rack gear for rear right-hand record post (9)
31121	Gear—Record post gear (10)
31123	Guide—Main lever spring guide (11)
31114	Lever—Index lever assembly (12)
31137	Lever—Index lever tension spring lever (13)
31138	Lever—Locating lever and pawl assembly (14)
31113	Lever—Main lever assembly (15)
31140	Lever—Pickup lift cable lever and spring assembly (16)
31135	Lever—Pickup locating lever assembly (17)
31130	Lever—Record separator elevating lever complete with adjustment screws (18)
31132	Lever—Trip detaining lever (19)
31115	Lever—Trip lever assembly (20)
31131	Lever—Trip regulator lever (21)
31133	Pawl—Trip pawl assembly (22)
31124	Pin—Record post drive pin (23)
14207	Roller—Pickup lift cable roller and bracket assembly (24)
31118	Screw—Cone pointed set screw for trip lever hub or record post shelf
4563	Screw—Pickup lift cable screw and nuts
14195	Screw—Set screw for flexible coupling
31117	Screw—Special screw to adjust friction clutch tension
31126	Separator—Record separator knife (25)
31122	Shaft—Record separator post shaft (26)
31125	Shelf—Record post shelf assembly (27)
31141	Spindle—Turntable spindle shaft
3676	Spring—Cam pawl tension spring on main gear
14190	Spring—Pickup locating lever short spring or locating lever pawl tension spring (28)
32882	Spring—Main lever tension spring (29)
31136	Spring—Index lever tension spring (30)
3666	Spring—Pickup lift cable tension spring (31)
31127	Spring—Record separator pressure spring (32)
14191	Spring—Trip detaining lever tension spring (33)
31875	Spring—Pickup locating lever tension spring (34)
32436	Spring—Locating lever tension spring (35)
31147	Strip—Complete set of rubber strips for flexible coupling
31139	Turntable Assembly—less spindle
31128	Washers—"C" washer for top of record post
31143	Washers—Turntable thrust washers (1 steel, 1 bronze, 1 felt)
	MOTORBOARD ASSEMBLIES
31149	Base—Tone arm mounting base
32927	Board—Record changer base complete with all welded and riveted posts and bearings—less all operating parts
14209	Bumper—Main lever rubber bumper (1)
9848	Cup—Used needle cup, rest, and lid complete
32877	Escutcheon—Index escutcheon
31151	Guide—Pickup lift cable guide (coil spring) (2)
31150	Mounting—Pickup arm base rubber mounting complete
31155	Spring—Needle cup lid tension spring
	MOTOR ASSEMBLIES
31626	Field—Complete coil and laminations for 25 cycle motor
31619	Field—Complete coil and lamination for 50-60 cycle motor
31618	Field—Complete coil and laminations for 60 cycle motor
31624	Governor—Governor complete for 25 cycle motor
11703	Governor—Governor complete for 50-60 cycle motor
31623	Governor—Governor complete for 60 cycle motor
31448	Motor—105-125 volts, 25 cycles (M1)
31163	Motor—105-125 volts, 50-60 cycles (M1)
31157	Motor—105-125 volts, 60 cycles (M1)

STOCK No.	DESCRIPTION
30870	Plug—2-contact male plug for motor power cable
31447	Screw—Complete set of motor mounting screws, washers, and spacers—for 25 cycle models only
31158	Screw—Complete set of motor mounting screws, washers, and spacers—for 50-60 cycle models only
31636	Shaft—Turntable spindle shaft and gear for 25 cycle motor
31634	Shaft—Turntable spindle shaft and gear for 50-60 and 60 cycle motor
32913	Spring—Governor weight and spring for 25 cycle motor
32914	Spring—Governor weight and spring for 50-60 cycle motor
32912	Spring—Governor weight and spring for 60 cycle motor
32875	Switch—Motor control switch (S6)
	PICKUP AND ARM ASSEMBLIES
33096	Arm—Pickup arm, less crystal and cable
32635	Cable—Pickup arm lift cable and clips
32556	Cable—Shielded cable and plug
31156	Crystal—Pickup crystal cartridge and needle screw
33114	Damper—Viscoloid damper for armature
31160	Screw—Pickup needle screw
31161	Shaft—Pickup pivot arm and shaft assembly
	SPEAKER ASSEMBLIES (RL-70H-5)
13866	Cap—Dust cap for cone center
12012	Coil—Field coil (L16)
11469	Coil—Neutralizing coil (L15)
31275	Cone—Speaker cone and voice coil (L14)
31539	Plug—5-contact male plug for speaker
32146	Speaker complete
14534	Transformer—Output transformer (T2)
14357	Washer—Spring washer to hold field coil securely
	MISCELLANEOUS ASSEMBLIES
12038	Band—Rubber band for Magic Eye
31397	Button—Station selector push-button
13103	Cap—Pilot light jewel
31456	Cover—8 protective covers for push-button markers
31541	Cushion—Motor plate mounting cushions and clamps sufficient for one instrument
32495	Dial—Glass dial scale (Model U25 only)
32494	Dial—Glass dial scale (Model U26 only)
31407	Escutcheon—Magic Eye or Electric Tuning indicator escutcheon
31395	Escutcheon—Tuning dial escutcheon only, less push-buttons and dial scale
30698	Hinge—Lid hinge complete with screws
4585	Hinge—One upper and one lower door hinge (Model U26 only)
31564	Holder—Needle card holder
31543	Indicator—Electric tuning indicator disc
31392	Indicator—Indicator pointer, carriage and clip
31355	Knob—Range switch knob
14359	Knob—Station selector knob
31391	Knob—Tone control knob
30773	Knob—Volume control knob
31460	Marker—"Dial Tuning" push-button marker (Model U25 only)
31458	Marker—"Dial Tuning" push-button marker (Model U26 only)
31459	Marker—"Victrola" push-button marker (Model U25 only)
31457	Marker—"Victrola" push-button marker (Model U26 only)
31590	Markers—1 set station call letter markers (Model U25 only)
31589	Markers—1 set station call letter markers (Model U26 only)
11210	Screw—Chassis mounting, screws, washers, and lockwashers
31393	Screen—Dial color screen
32870	Screen—Phono. compartment lamp screen
33083	Spring—Actuating spring for lid support (Model U26 only)
30330	Spring—Retaining spring for knob, Stock No. 31391
14270	Spring—Retaining spring for knob, Stock Nos. 30773 and 31355
4982	Spring—Retaining spring for knob, Stock No. 14359
31470	Spring—Motorboard suspension top spring, bottom spring, screw, and lockwasher (4 req'd)
33081	Support—Right-hand lid support (Model U26 only)
33082	Support—Left-hand lid support (Model U26 only)
31478	Support—Lid support (Model U25)

RCA Victor

MODELS U-30 and U-129

Chassis No. RC-335KR, RC-335K

Ten-Tube, Three-Band, Electric Tuning, A-C Victrolas

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 11—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

"Standard Broadcast" (A) ..... 540-1,720 kc
"Medium Wave" (B) ..... 2,300-7,000 kc
"Short Wave" (C) ..... 7,000-22,000 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6A8 ..... First Det.
(2) RCA-6J7 ..... Oscillator
(3) RCA-6K7 ..... I-F Amp.
(4) RCA-6H6 .. 2nd Det. and A.V.C.
(5) RCA-6F5 ..... First Audio
(6) RCA-6F5 ..... Phase Inverter
(7) RCA-6F6-G ..... Power Output
(8) RCA-6F6-G ..... Power Output
(9) RCA-5U4-G ..... Rectifier
(10) RCA-6U5 ..... "Magic Eye"

POWER SUPPLY RATING

		Radio Only	Total
A	105-125 volts,	50-60 cycles, 120 watts	145 watts
A-6	105-125 volts,	60 cycles, 120 watts	145 watts
B-2	105-125 volts,	25 cycles, 120 watts	145 watts
C	105-130/140-160/200-250 volts,	50-60 cycles, 120 watts	145 watts
C-6	105-130/140-160/200-250 volts,	60 cycles, 120 watts	145 watts

POWER OUTPUT

Undistorted ..... 10 watts
Maximum ..... 12 watts

LOUDSPEAKER

Type ..... 12-inch Electrodynamic
Voice Coil Impedance ..... 2.2 ohms at 400 cycles

PHONOGRAPH

Record Capacity ..... Seven ten or twelve inch
Turntable Speed ..... 78 R.P.M. (Adjustable)

Type Pickup ..... Crystal
Pickup Impedance ..... 80,000 ohms at 1,000 cycles

Mechanical Specifications

	U-30	U-129
Height (inches)	34	35
Width (inches)	36¼	33¼
Depth (inches)	17⅞	17
Tuning Drive Ratio	18 to 1	18 to 1
Weight (Net lbs.)	101	104
Weight (Shipping lbs.)	141	134
Chassis Base (inches)	15⅝ x 8½ x 3⅛	
Maximum chassis height (inches)	8¼	

General Description

These receivers employ a ten-tube, three-band, "Magic Brain" superheterodyne circuit. Features of design include: "Electric Tuning" for eight broadcast stations; a link-coupled antenna circuit; magnetite-core i-f transformers and "A"-band oscillator coil; full automatic volume control; "Magic Eye" tuning tube; improved 12-inch dust-proof electrodynamic loudspeaker; aurally compensated audio volume control; continuously variable high-frequency tone control; provision for armchair control attachment; illuminated band indicator; noise-reducing antenna adjustment on "A" band; temperature-stabilized capacitors; phase inverter audio amplifier; and push-pull power output stage.

The phonograph has a self-starting motor, crystal pickup, and may be set to play ten-inch and twelve-inch records singly, or automatically. In the automatic position, seven twelve-inch; eight ten-inch; or a mixed group of seven, ten- and twelve-inch records, may be played in succession. The output of the pickup is "shorted" out when the pickup is on the pickup rest.

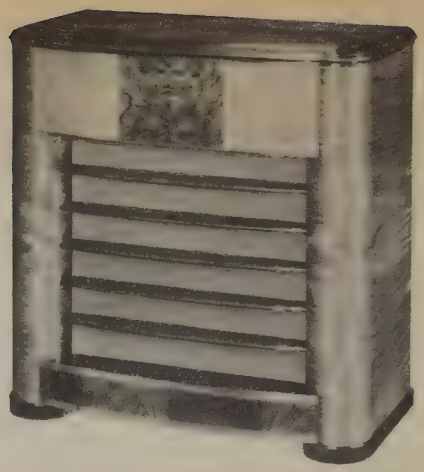
First Edition

Trademark "Magic Eye," "Magic Brain," "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Model U-30

Model U-129



Service Data

Loudspeaker.—Centering of the loudspeaker is made in the usual manner with three narrow celluloid or paper feelers after first removing the front dust cover. A dust cover should be cemented in place upon completion of adjustment.

Precautionary Lead Dress. — (1) The lead from the left pilot light should be kept behind the bulb and toward the "Magic Eye," to keep it away from the 6F5 grid cap, (2) leads from mica trimmers to coil should be kept away from the coil and other parts, (3) leads on oscillator coil which are an extended part of the coil winding should be as short as possible, (4) "C" band series capacitor C31 must have leads as short as possible, (5) all leads from antenna board to antenna coils should be dressed toward back apron, (6) the one lead of the line cord and the primary lead of the power transformer which run to the power switch should be twisted together, (7) shielding on leads to Victrola switch should be kept away from the switch terminals and jack.

Antenna Connections

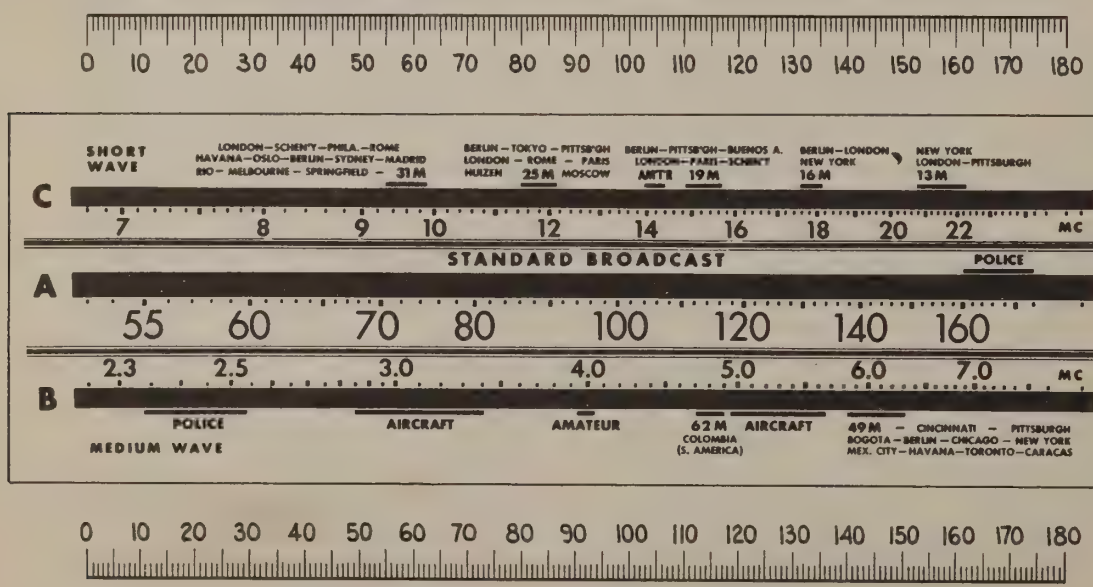
RCA Victor Master Antenna Kit.—Connect the twisted-pair transmission line to terminals A1 and A2 on the terminal board at rear of chassis. Connect the counter-poise to A3. Terminal G may be connected to ground, but this connection is not necessary for correct operation.

Noise-Reducing Adjustment.—After the RCA Victor Master Antenna Kit is connected to the receiver, tune the receiver to a point near 900 kc where no station is heard. Turn volume control clockwise until noise is heard. If no noise of a regular character is audible, start any brush-type motor-driven appliance, such as a vacuum cleaner, electric razor, refrigerator, etc., but do not bring it too near the receiver. This will generate noise as a continuous crackling, or buzz. Adjust C5, which is mounted behind the antenna terminal board, to a point where this noise is reduced to a minimum.

Adjustment of the noise reducing trimmer C5 should be made in the customer's home, with the RCA Victor Master Antenna connected to the receiver.

This adjustment is effective only when the RCA Victor Master Antenna is used. For all other types of antenna, the noise-adjustment trimmer C5 should be screwed all the way down.

Other Antennas.—Use terminals A1 and A3 on the receiver terminal board as antenna and ground connecting points respectively. Terminal A3 may be connected to terminal G, unless this causes interference, in which case this connection should be omitted.



Tuning Dial, and Corresponding 0-180° Calibration Scale

The corresponding dial setting for any reading of the calibration scale can be determined by drawing a line straight up from this point; for example, 151.5° on the calibration scale corresponds to a dial reading of 1,500 kc on "A" band. Read instructions under "Alignment Procedure."

ALIGNMENT PROCEDURE

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

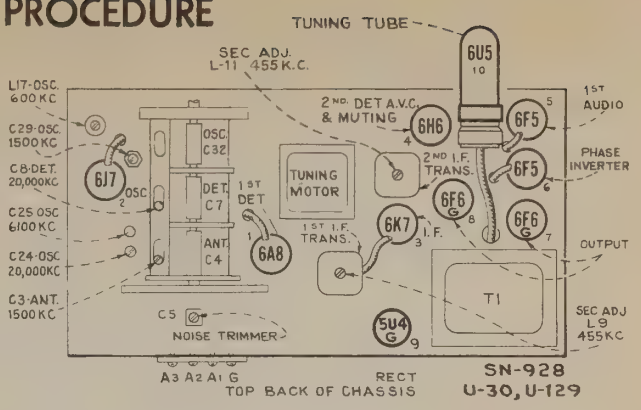
Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the rear of the indicator-drive-cord drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The "0" mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "0" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

For additional details, refer to booklet "RCA Victor Receiver Alignment."



Tube and Trimmer Locations

Steps	Connect the high side of test-oscillator to —	Tune test-oscillator to —	Range Selector	Set tuning gang to—	Adjust the following for max. peak output
No. 1	6K7 I-F grid cap in series with .01 mfd.	455 kc	"A"	Quiet point between 550-750 kc	L10, L11 (2nd I-F Transformer)
No. 2	6A8 Det. grid cap in series with .01 mfd.	455 kc	"A"		L8, L9 (1st I-F Transformer)
No. 3	A2 Connect A1 to chassis.	20 mc	"C"	20 mc (147.5°)	C24 (osc.)* C8 (det.)†
No. 4	A2, in series with 100 mmfd. Connect A3 to chassis.	6,100 kc	"B"	6,100 kc (145.5°)	C25 (osc.)**
No. 5	A2, in series with 100 mmfd. Connect A3 to chassis.	1,500 kc	"A"	1,500 kc (151.5°)	C29 (osc.) C3 (ant.)
No. 6	A2, in series with 100 mmfd. Connect A3 to chassis.	600 kc	"A"	600 kc (29.5°)	L17 (osc.)
No. 7	A2, in series with 100 mmfd. Connect A3 to chassis.	1,500 kc	"A"	1,500 kc (151.5°)	C29 (osc.)

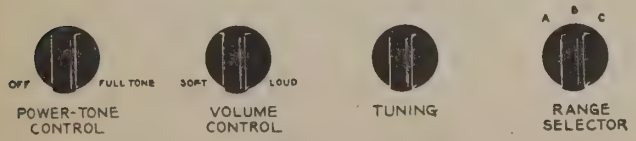
* Use **minimum** capacity peak if two peaks can be obtained. Check to determine that the correct peak has been used by turning to 141.5° (19,090 kc), at which point a weaker signal should be received.

** Use **minimum** capacity peak if two peaks can be obtained. Check to determine that the correct peak has been used by turning to 124° (5,190 kc), at which point a weaker signal should be received.

† Rock gang condenser and use maximum capacity peak if two peaks can be obtained with C8.

ADJUSTMENTS FOR ELECTRIC TUNING

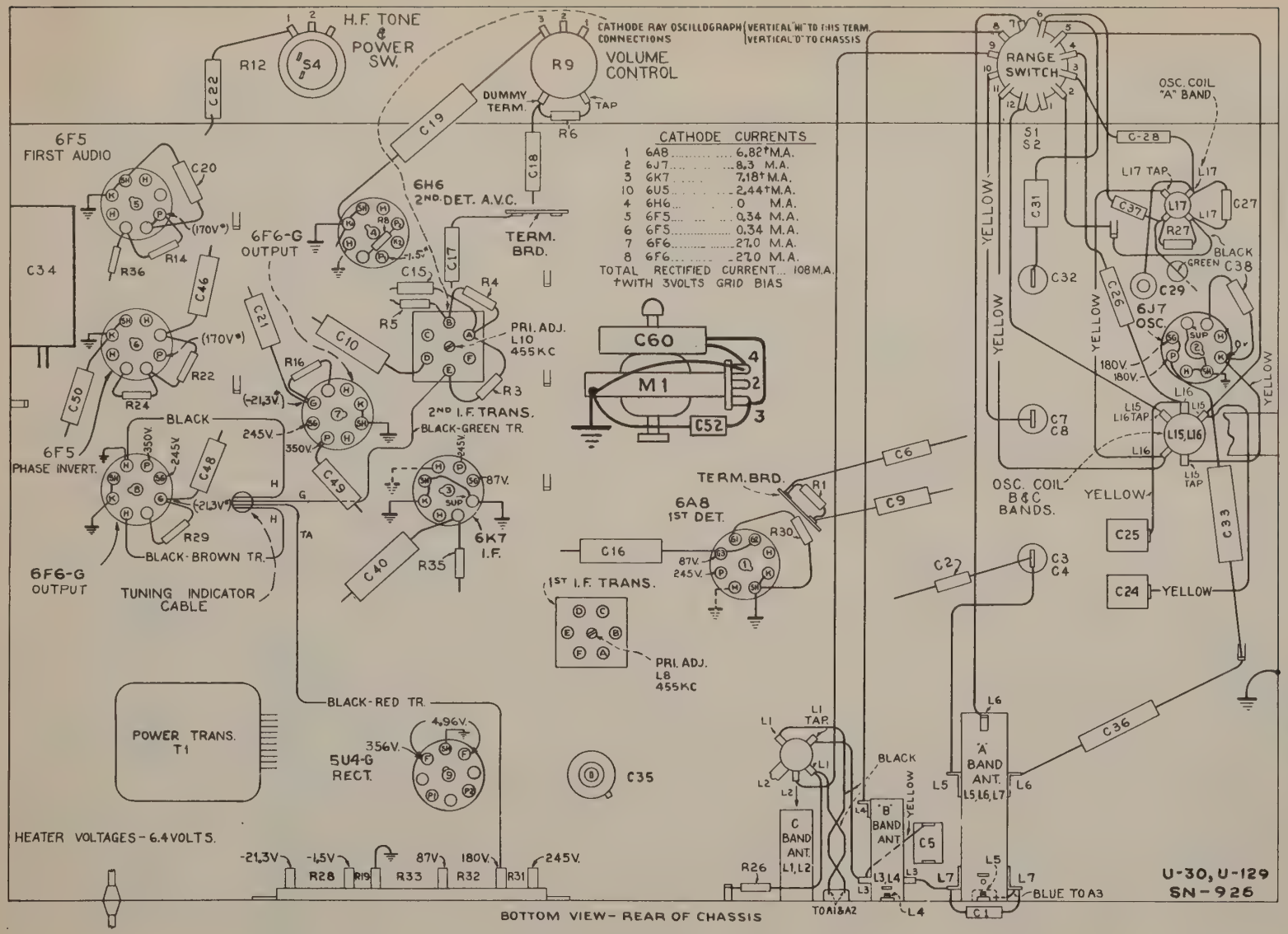
1. Make a list of the desired eight stations, arranged in order from low to high frequencies.

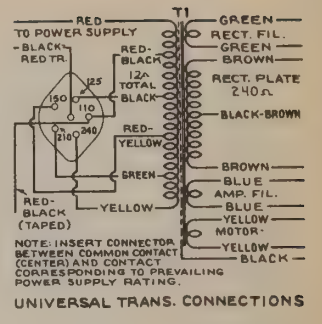


Location of Controls

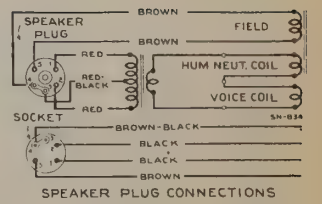
The left-hand push-button is a Victrola-Attachment switch. The right-hand push-button is for dial tuning.

2. Turn range selector to "A" band, turn power on, and allow a few minutes for warming up.
3. Press down the "dial-tuning" (right-hand) button.
4. Manually tune in the first station on the list, using the "Magic Eye" for accurate tuning.
5. Hold down the "dial-tuning" button, and press down station button No. 1 (second from left). Both buttons will stay down. Move adjusting pin No. 1 to the insulating line on the disc at rear of gang. When the pin is correctly centered on the insulating line, the central dial lamp will go out.
6. Press down any other button in order to release the dial-tuning button and station button No. 1. Then press down station button No. 1 again. The electric tuning mechanism will function to tune in the station, and the central dial lamp will stay on.
7. Repeat this process for the remaining stations.





Above — Universal Power Transformer Connections.

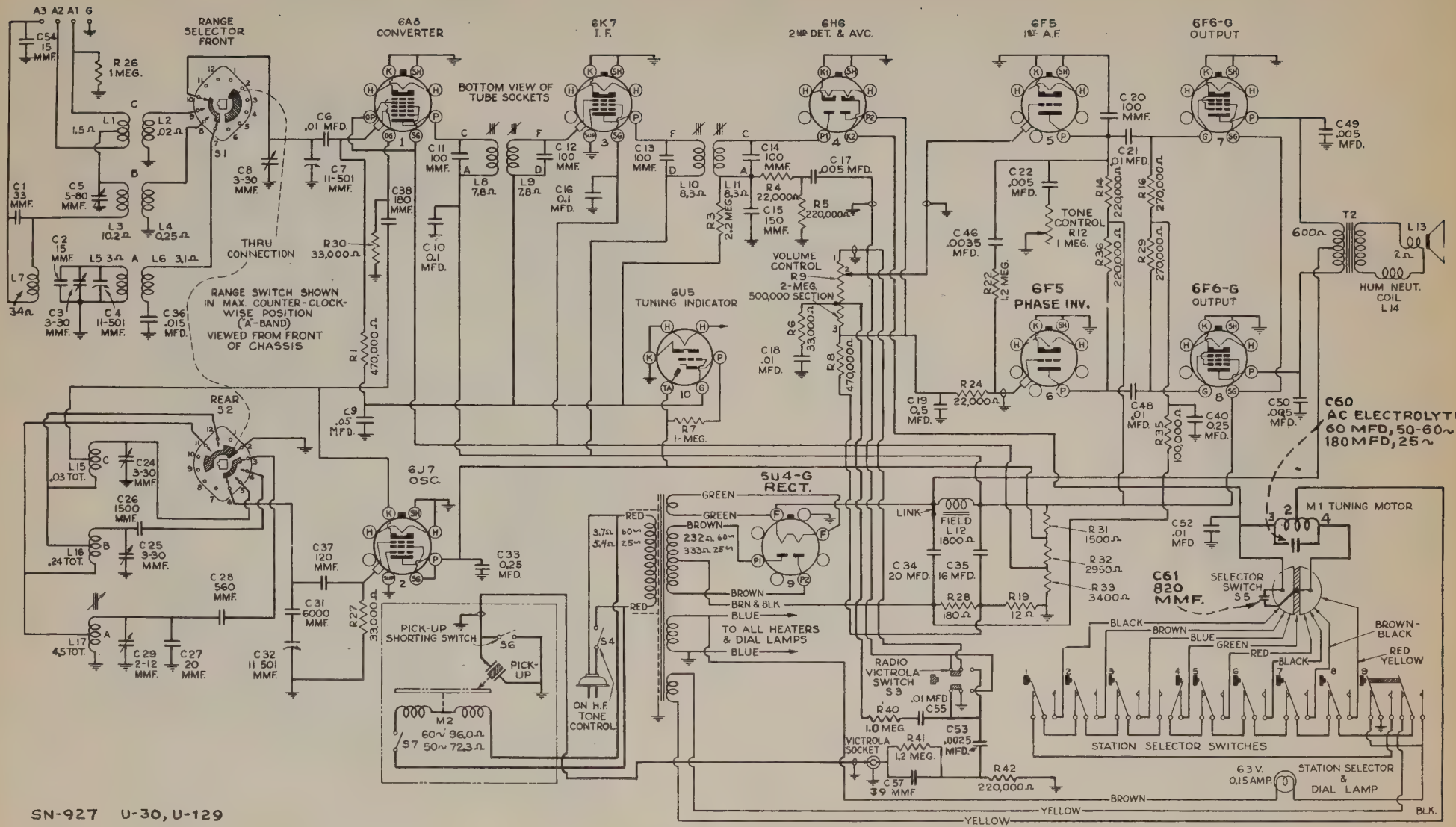


Above — Connections and Colors of Loudspeaker and Cable.

R-F Wiring Diagram and Socket Voltages

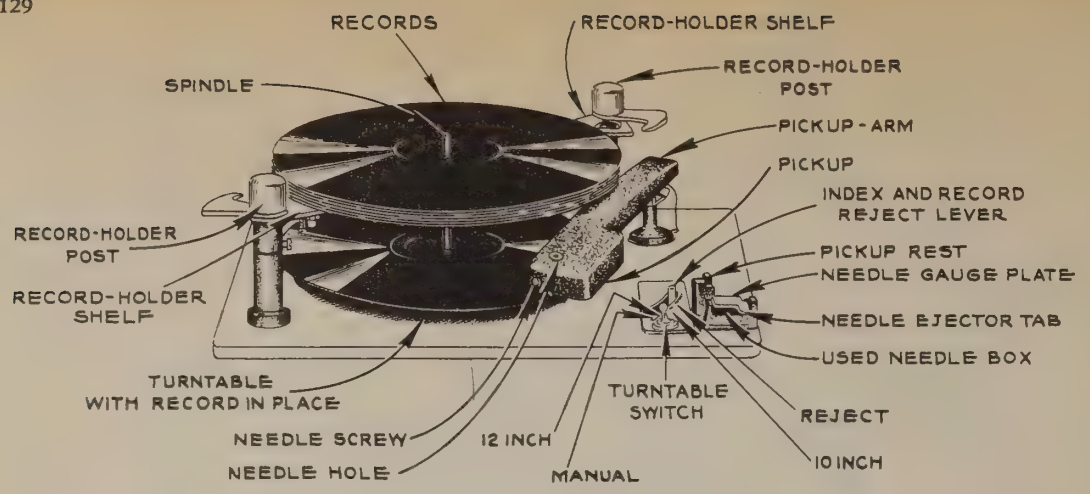
Measurements made to chassis unless otherwise indicated, with set tuned to quiet point, volume control at minimum. Values should hold within approximately ±20% with 117-volt a-c supply.

***NOTE:** Values with star (*) are operating voltages in circuits with high series-resistance, and when measured will read lower depending on the voltmeter loading.

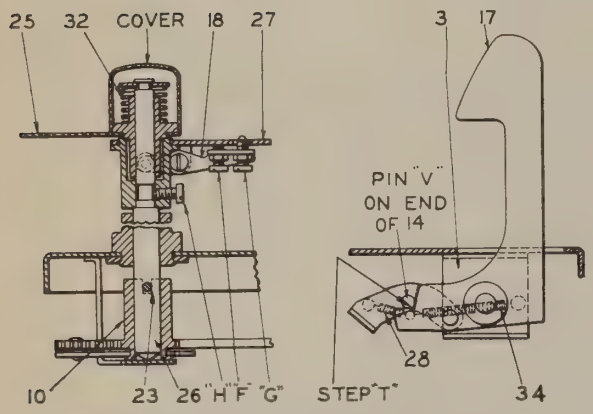


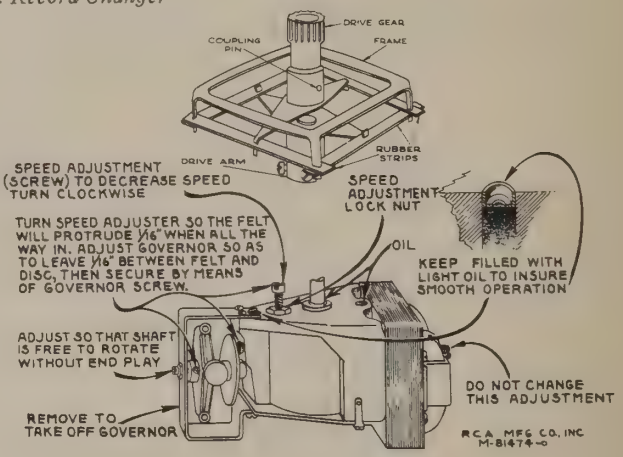
Schematic Circuit Diagram

In Model U-30, a 1.0 megohm resistor (R43) is connected from the Victrola socket to chassis.

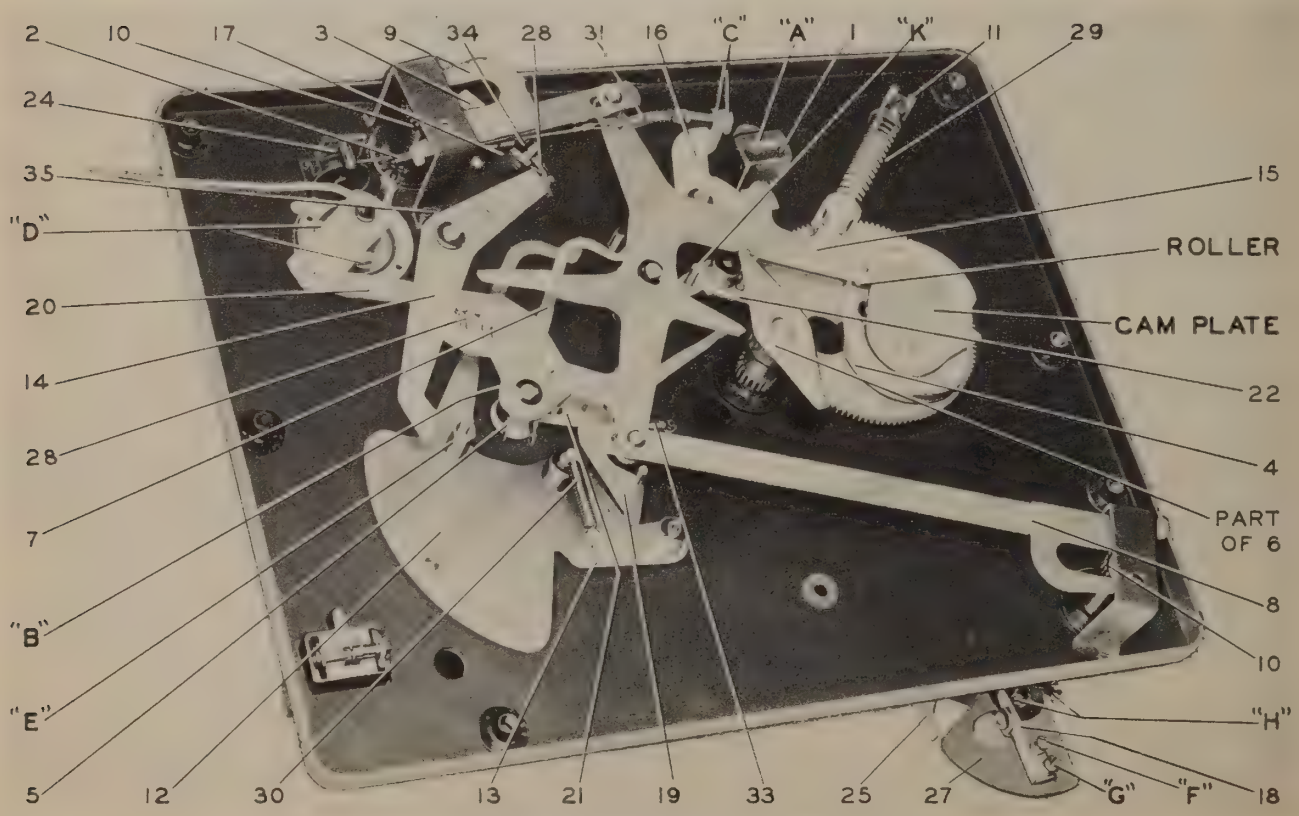


Top View of Automatic Record Changer




DRIVE GEAR
COUPLING PIN
FRAME
RUBBER STRIPS
DRIVE ARM
SPEED ADJUSTMENT (SCREW) TO DECREASE SPEED TURN CLOCKWISE
SPEED ADJUSTMENT LOCK NUT
TURN SPEED ADJUSTER SO THE FELT WILL PROTRUDE 1/16" WHEN ALL THE WAY IN. ADJUST GOVERNOR SO AS TO LEAVE 1/16" BETWEEN FELT AND DISC, THEN SECURE BY MEANS OF GOVERNOR SCREW.
OIL
KEEP FILLED WITH LIGHT OIL TO INSURE SMOOTH OPERATION
ADJUST SO THAT SHAFT IS FREE TO ROTATE WITHOUT END PLAY
DO NOT CHANGE THIS ADJUSTMENT
REMOVE TO TAKE OFF GOVERNOR
RCA MFG CO. INC
M-81474-0

Details of Record Shelf Posts, and Locating Lever Assemblies



Bottom View of Automatic Record Changer

NOTE: Numbers refer to parts—letters refer to adjustments.

GENERAL INFORMATION

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc. are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and revolving the turntable by hand. Six turntable revolutions are required for one change cycle.

The turntable, spindle, and pinion gear are assembled by means of a 3/32 inch straight pin. This pin may be removed by gently driving with a standard pin punch.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

The 10 and 12 inch records must be absolutely flat for smooth operation when using a mixture of the two sizes.

A shorting switch, located in the pickup head, operates due to pressure when the pickup is placed on the pickup rest.

ADJUSTMENTS

A. Main Lever.—This lever is basically important in that it interlinks the various individual mechanisms which control needle landing, tripping, record separation, etc. One adjustment is provided for the main lever. Rotate the turntable until the changer is out-of-cycle; and adjust rubber bumper bracket (A) so that the roller clears the nose of the cam plate by 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the record is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pickup is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the trip finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.

C. Pickup Lift Cable Screw.—During the record change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pickup lift cable. To adjust pickup for proper elevation, stop the changer "in-cycle" at the point where pickup is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknuts "C" to obtain 1 inch spacing between needle point and turntable top surface.

D. & E. Needle Landing on Record. — The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10 inch record. Position of eccentric stud "E" governs the landing of the needle on a 12 inch record; this, however, is dependent on the proper 10 inch adjustment.

To adjust for needle landing, place 10 inch record on turntable; push index lever to reject position and return to the 10 inch position; see that pickup locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on the record; then see that pin "V" on lever "14" is in contact with "Step T" on lever "17." The correct point of landing is 4-11/16 inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17". Leave approximately 1/32 inch end play between hub of lever "20" and pickup base bearing, and tighten the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone pointed screw "D".

After adjusting for needle landing on a 10 inch record, place 12 inch record on turntable; push index lever to reject and return to 12 inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5-11/16 inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be toward the rear of the motor board, otherwise incorrect landing may occur with 10 inch records.

F. & G. Record Separating Knife. — The upper plate (knife) "25" on each of the record posts serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "27" be accurately maintained. The spacing for the 10 inch record is nominally .058 inch, and for the 12 inch record is .075 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "F" to give .055—.061 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F" adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072—.078 inch.

H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustments be such that the record is released from both shelves at the same instant. To adjust, place a 12 inch record on the turntable, rotate mechanism into cycle to the point where tone arm is at maximum distance outward from turntable; lift record upward until it is in contact with both separating knives, then loosen screws "H" and shift record shelves so that the curved inner edges of the shelves are uniformly spaced at least 1/16 inch from record edge. Tighten the blunt nose screw "H," run mechanism through cycle several times to check action, then tighten cone pointed screw "H".

If record shelves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown).—When the changer is out-of-cycle, the front lower edge of the pickup head should be 5/16 inch above surface of motor board. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication.—Petrolatum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motor board.

The felt washer between the turntable and spindle bearing should be soaked in light engine oil whenever the turntable is removed, or as required for proper operation.

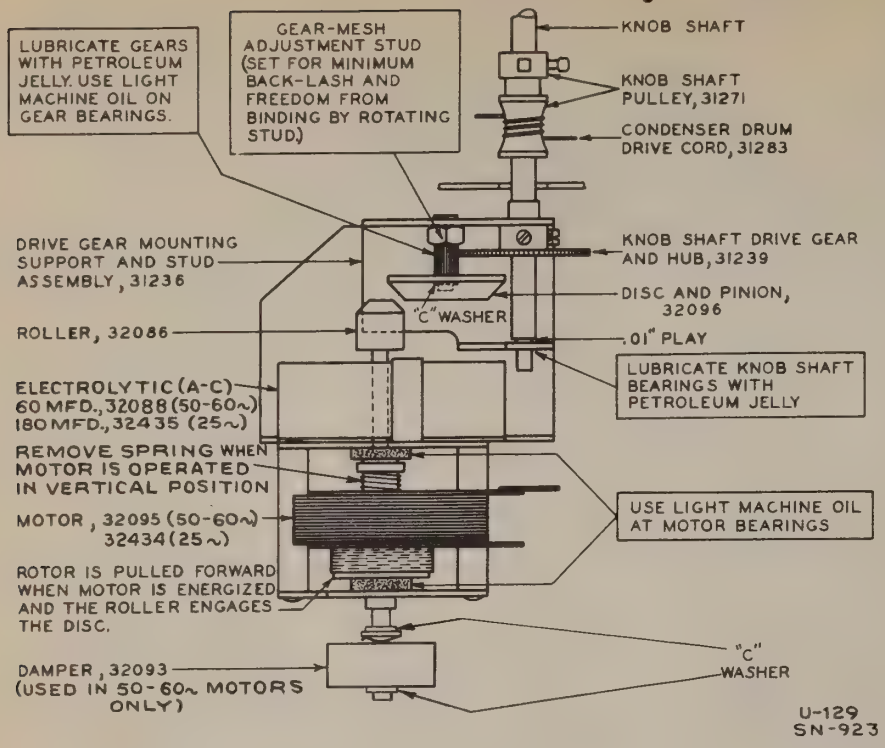
Do not allow oil or grease to come in contact with, rubber mounting of tone arm base, rubber bumper, or flexible coupling of drive motor.

MISCELLANEOUS SERVICE HINTS

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual mis-adjustments will enable ready adjustment in most cases.

1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A".
2. Needle does not land properly on both 10 and 12 inch records—Make complete adjustments "D" and "E".
3. Needle does not land properly on 12 inch record but correct on 10 inch—Effect adjustment "E".
4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B". Also, see that levers "7" and "12" are free to move without touching each other.
5. Pickup strikes lower record of stack or drags across top record on turntable—Adjust lift cable per adjustment "C".
6. Needle does not track after landing—Friction clutch "5" adjustment "B" may be too tight; bind in tone arm vertical bearing; levers "7" and "12" fouled; or pickup output cable twisted.
7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.
8. Wow in record reproduction—Record is defective; flexible coupling between motor and changer mechanism not correctly assembled; or instrument is not being operated at normal room temperature (65° F).
9. Record knives strike edge of records—Records warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.
10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H".
11. Needle lands in 10 inch position on 12 inch record or misses record when playing both types mixed—Increase tension of pickup locating lever spring "34".

Electric Tuning Mechanism


LUBRICATE GEARS WITH PETROLEUM JELLY. USE LIGHT MACHINE OIL ON GEAR BEARINGS.
GEAR-MESH ADJUSTMENT STUD (SET FOR MINIMUM BACK-LASH AND FREEDOM FROM BINDING BY ROTATING STUD.)
KNOB SHAFT
KNOB SHAFT PULLEY, 31271
CONDENSER DRUM DRIVE CORD, 31283
DRIVE GEAR MOUNTING SUPPORT AND STUD ASSEMBLY, 31236
KNOB SHAFT DRIVE GEAR AND HUB, 31239
DISC AND PINION, 32096
"C" WASHER
.01" PLAY
ROLLER, 32086
LUBRICATE KNOB SHAFT BEARINGS WITH PETROLEUM JELLY
ELECTROLYTIC (A-C) 60 MFD., 32088 (50-60~) 180 MFD., 32435 (25~)
REMOVE SPRING WHEN MOTOR IS OPERATED IN VERTICAL POSITION
USE LIGHT MACHINE OIL AT MOTOR BEARINGS
MOTOR, 32095 (50-60~) 32434 (25~)
ROTOR IS PULLED FORWARD WHEN MOTOR IS ENERGIZED AND THE ROLLER ENGAGES THE DISC.
"C" WASHER
DAMPER, 32093 (USED IN 50-60~ MOTORS ONLY)
U-129 SN-923

When a station button is pushed in, it completes the 24-volt circuit through the corresponding station-setting contact and one-half of the brass selector disc, which is connected to one side of the motor field coil. This energizes the motor, and the rotor is pulled forward, engaging with the gear train that drives the tuning condenser and selector disc. The condenser and disc rotate until the insulation line comes under the particular station-setting contact, and the motor circuit is broken.

When the electric tuning mechanism is in action, the motor-supply voltage is fed into a diode rectifier circuit which applies a high bias to the first-audio amplifier. This prevents audio amplification and makes the set quiet or "mute" while the mechanism is operating.

The brass selector disc is fastened to the rear shaft of the tuning condenser by means of two set-screws. When the condenser is at maximum (plates fully meshed) the insulation line should be horizontal, with the operating-end at the left (viewed from rear). The operating-end has dark insulating material and the brass is beveled at this end.

The selector disc should be set so that the contact-tip plungers in the station-setting contacts project not more than 1/16-in. from the body of the contacts.

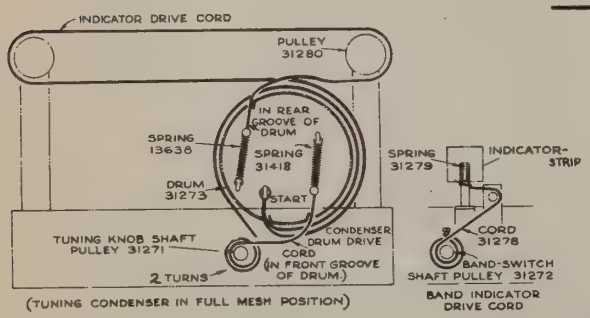
Lubrication

Motor bearings and gear bearings; use light machine oil.

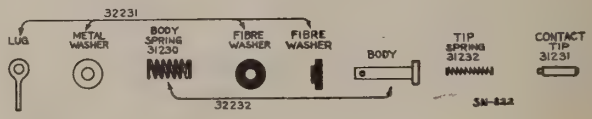
Gear faces; use "Pure Oil No. 611" or petroleum jelly.

Dial-indicator pulleys and rails; use "Castordag" or petroleum jelly.

Selector disc; apply ***thin*** film of petroleum jelly.



At left—Dial Mechanism



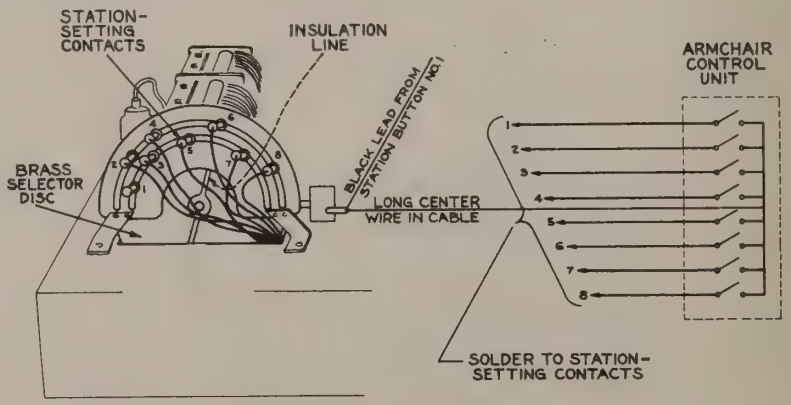
Component Parts of Station Setting Contact

Armchair Control Unit

Station-Setting Contacts and Selector Disc

This illustration shows connections for a G8A Armchair Control Unit. This unit is not supplied with the receiver but may be added as an accessory.

Station Button	Color of Lead To Station-Setting Contact
No. 1	Black
No. 2	Brown
No. 3	Blue
No. 4	Green
No. 5	Red
No. 6	Red-black
No. 7	Brown-black
No. 8	Red-yellow



When a Model G8A Armchair Control is connected to the receiver it duplicates the action of the push-buttons on the front panel when No. 1 button is pressed down. The black lead from push-button No. 1 is unsoldered from No. 1 station-setting contact and soldered to a terminal board which is to be mounted on the frame of selector mechanism. If desired one of the other seven station buttons on the set may be used in place of No. 1 button.

This arrangement allows the use of only seven of the eight buttons when tuning in stations at the set, but allows the use of the entire eight buttons on the Armchair Control. In operating the G8A Armchair Control the push-button must be held down until the station has been tuned in. Care must be taken not to hold two of the station-buttons down at one time as both windings of the motor may be engaged instantaneously causing the motor to be inoperative and overheated.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-335K and RC-335KR)
31531	Board—Antenna and ground terminal board
32232	Body—Comprising one plunger body and one body spring
31276	Bracket—Band indicator mounting bracket complete—less indicator strip, cord, and tension spring
31282	Bracket—Magic Eye mounting bracket and holder
32090	Bracket—Motor mounting bracket and studs
12714	Capacitor—Adjustable trimmer, 2-12 mmfd. (C29)
31292	Capacitor—Dual adjustable trimmer, 3-30 mmfd. each section (C24, C25)
31252	Capacitor—Adjustable trimmer, 5-80 mmfd. (C5)
12896	Capacitor—15 mmfd. (C2, C54)
12948	Capacitor—33 mmfd. (C1)
31432	Capacitor—20 mmfd. (C27)
13545	Capacitor—39 mmfd. (C57)
12720	Capacitor—100 mmfd. (C20)
31270	Capacitor—100 mmfd. (C11, C12, C13, C14)
12724	Capacitor—120 mmfd. (C37, C38)
12725	Capacitor—150 mmfd. (C15)
31433	Capacitor—560 mmfd. (C28)
31033	Capacitor—1,500 mmfd. (C26)
31405	Capacitor—6,000 mmfd. (C31)
5107	Capacitor—.0025 mfd. (C53)
30303	Capacitor—.0035 mfd. (C46)
4838	Capacitor—.005 mfd. (C17, C22, C49, C50)
4858	Capacitor—.01 mfd. (C21, C48)
14393	Capacitor—.01 mfd. (C6, C18, C39, C52)
11315	Capacitor—.015 mfd. (C36)
30882	Capacitor—.05 mfd. (C9)
4839	Capacitor—0.1 mfd. (C10, C16)
12484	Capacitor—0.25 mfd. (C33)
30965	Capacitor—0.25 mfd. (C40)
30867	Capacitor—0.5 mfd. (C19)
31496	Capacitor—16 mfd. (C35)
31495	Capacitor—20 mfd. (C34)
32088	Capacitor—60 mfd., a-c electrolytic, 40 V. (50-60 cycle only)
32435	Capacitor—180 mfd., a-c electrolytic, 40 V. (25 cycle only)
31293	Coil—"A" band antenna coil (L5, L6, L7)
31296	Coil—"A" band oscillator coil (L17)
31294	Coil—"B" band antenna coil (L3, L4)
31295	Coil—"B" and "C" band oscillator coil (L15, L16)
31297	Coil—"C" band antenna coil (L1, L2)
31290	Condenser—3-gang variable condenser (C3, C4, C7, C8, C32)
31231	Contact—Contact tip for station-setting contact
31345	Contact—Push button switch contacts—comprising 10 contacts riveted on insulating strip
31344	Contact—Push button switch contacts—comprising 13 contacts riveted on insulating strip
31278	Cord—Band indicator drive cord
32635	Cord—Indicator pointer drive cord
32634	Cord—Variable condenser drum drive cord
31269	Core—Adjustable core and stud for i-f transformers
31260	Core—Adjustable core and stud for "A" band oscillator coil
32093	Damper — Flywheel damper — less mounting washers for rear end of tuning motor shaft (50-60 cycle motors only)
32096	Disc—Friction disc and pinion gear
32091	Drive—Drive gear assembly — comprising friction disc and pinion gear, drive gear, and knob shaft, assembled on gear-mounting bracket
31273	Drum—Indicator drive cord drum
31239	Gear—Knob shaft drive gear and hub
31545	Gear—Variable condenser intermediate drive gear and pinion gear—25 cycle models only
31532	Indicator—Band indicator strip
11891	Lamp—Dial, pilot, or compartment lamp, 6.3 V, 0.25 amp.
31480	Lamp—Electric tuning adjustment indicator lamp, 6.3 V, 0.15 amp.
31346	Lock—Push button switch lock plate—comprising 10 contact locks in one strip
32095	Motor—Electric tuning motor, 60 mfd. capacitor, friction roller, and damper, assembled (50-60 cycle only)
32434	Motor—Electric tuning motor, 180 mfd. capacitor, and friction roller (25 cycle only)
31228	Plate—Selector contact plate—less contacts
31227	Plate—Selector mounting plate—mounts on rear of variable condenser
30868	Plug—2-contact female plug for phono. motor cable
12493	Plug—5-contact female plug for speaker cable
32232	Plunger—Station setting contact tip
31280	Pulley—Indicator pointer drive cord pulley
31271	Pulley—Motor pulley
31272	Pulley—Range switch pulley
31250	Resistor—Voltage divider—comprising one 1,500 ohm, one 2,950 ohm, one 3,400 ohm, one 12 ohm, and one 180 ohm sections (R19, R28, R31, R32, R33)
14284	Resistor—22,000 ohms, 1/10 watt (R24)
13998	Resistor—22,000 ohms, ½ watt (R4)
11300	Resistor—33,000 ohms, 1/10 watt (R27, R30)
12454	Resistor—33,000 ohms, ½ watt (R6)
14560	Resistor—100,000 ohms, ½ watt (R35)
12264	Resistor—220,000 ohms, ½ watt (R5, R36)
11398	Resistor—220,000 ohms, 1/10 watt (R14)
11453	Resistor—270,000 ohms, 1/10 watt (R16, R29)
11452	Resistor—470,000 ohms, 1/10 watt (R1)
12285	Resistor—470,000 ohms, ½ watt (R8)
12013	Resistor—1 meg., 1/10 watt (R7, R26, R40)
13730	Resistor—1 meg., ¼ watt (R43) (U-30 only)
30208	Resistor—1.2 meg., ½ watt (R41)
5131	Resistor—2.2 meg., 1/10 watt (R3)
14887	Retainer—Indicator pointer drive cord pulley retainer
32086	Roller—Rubber friction roller for front end of motor (attach to motor shaft with shellac)
31233	Rotor—Selector rotor disc—mounts on rear of variable condenser shaft
4119	Screw—No. 8-32 headless set screw for gear, Stock No. 31239
14350	Screw—No. 8-32 square head set screw for selector rotor disc
4669	Screw—No. 8-32 square head set screw for pulley, Stock Nos. 31271 and 31272, and drum, Stock No. 31273
31681	Shaft—Dial drive knob shaft
31364	Socket—Dial lamp socket
13871	Socket—Magic Eye socket
31347	Socket—Pickup socket and bracket
31251	Socket—Tube socket
31365	Socket—Tuning indicator lamp insulated socket
31279	Spring—Band indicator tension spring
31232	Spring—Contact tip spring for station-setting contact
13638	Spring—Indicator pointer drive cord tension spring
31418	Spring—Variable condenser drive cord tension spring
12007	Spring—Retaining spring for core, Stock No. 31269
31230	Spring—Station-setting contact body spring
31262	Spring—Tension spring for core, Stock No. 31260
31970	Spring—Tension spring for push button switch latch bar
31236	Support—Variable condenser drive gear mounting support and studs assembly
31360	Switch—Pickup switch for mounting on push button switch assembly (S3)
31291	Switch—Range switch (S1, S2)
31312	Switch—Station selector push button switch and bracket complete
31248	Tone Control — H.f. tone control and power switch (R12, S4)
31267	Transformer—First i-f transformer (L8, L9, C11, C12)
31268	Transformer—Second i-f transformer (L10, L11, C13, C14)
31308	Transformer—Power transformer, 105/130-140/160-200/250 volts, 50-60 cycle (T1)
31226	Transformer—Power transformer, 110 volts, 25-60 cycle (T1)
31225	Transformer—Power transformer, 110 volts, 50-60 cycle (T1)
31249	Volume Control (R9)
32231	Washer—Comprising 1 metal washer, 2 fibre washers, and 1 solder lug or retainer for station selector plunger
32094	Washers—One set of washers for mounting damper on 50-60 cycle motors only—comprising 2 "C" washers, 1 sprng washer, and 1 flat washer
	OPERATING MECHANISM
31134	Bracket—Pickup locating lever mounting bracket (3)
31144	Cam—Cam and gear assembly (4) (U-129)
32878	Cam—Cam and gear assembly (4) (U-30)
6808	Clutch—Trip lever friction clutch assembly (5)
31146	Coupling—Motor coupling complete with turntable drive gear, rubber strips, motor coupling, and drive arm (6)
31129	Cover—Cap for top of record post
31116	Finger—Trip lever friction finger assembly (7)
31119	Gear—Long arm and rack gear for front left-hand record post (8)
31120	Gear—Short arm and rack gear for rear right-hand record post (9)
31121	Gear—Record post gear (10)
31123	Guide—Main lever spring guide (11)

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
31114	Lever—Index lever assembly (12)
31137	Lever—Index lever tension spring lever (13)
31138	Lever—Locating lever and pawl assembly (14)
31113	Lever—Main lever assembly (15)
31140	Lever—Pickup lift cable lever and spring assembly (16)
31135	Lever—Pickup locating lever assembly (17)
31130	Lever—Record separator elevating lever complete with adjustment screws (18)
31132	Lever—Trip detaining lever (19)
31115	Lever—Trip lever assembly (20)
31131	Lever—Trip regulator lever (21)
31133	Pawl—Trip pawl assembly (22)
31124	Pin—Record post drive pin (23)
14207	Roller—Pickup lift cable roller and bracket assembly (24)
31118	Screw—Cone pointed set screw for trip lever hub or record post shelf
4563	Screw—Pickup lift cable screw and nuts
14195	Screw—Set screw for flexible coupling
31117	Screw—Special screw to adjust friction clutch tension
31126	Separator—Record separator knife (25)
31122	Shaft—Record separator post shaft (26)
31125	Shelf—Record post shelf assembly (27)
31141	Spindle—Turntable spindle shaft
3676	Spring—Cam pawl tension spring on main gear (12 turns, .190-in. O.D., 43/64-in. lg.)
14190	Spring—Pickup locating lever short spring or locating lever pawl tension spring (28) (16 turns, .180-in. O.D., 19/32-in. lg.)
32882	Spring—Main lever tension spring (29) (18 turns, .6-in. O.D., 3-in. lg.)
31136	Spring—Index lever tension spring (30) (25 turns, .190-in. O.D., 15/16-in. lg.)
3666	Spring—Pickup lift cable tension spring (31) (20 turns, .195-in. O.D., 1-in. lg.)
31127	Spring—Record separator pressure spring (32) (8 turns, $\frac{5}{8}$-in. O.D., $\frac{3}{4}$-in. lg.)
14191	Spring—Trip detaining lever tension spring (33) (15 turns, .190-in. O.D., $\frac{3}{4}$-in. lg.)
31875	Spring—Pickup locating lever tension spring (34) (14 turns, .220-in. O.D., 27/32-in. lg.)
32436	Spring—Locating lever tension spring (35) (16 turns, .182-in. O.D., 21/32-in. lg.)
31147	Strip—Complete set of rubber strips for flexible coupling
31139	Turntable Assembly—less spindle
31128	Washers—"C" washer for top of record post
31143	Washers—Turntable thrust washers (1 steel, 1 bronze, 1 felt)
	PICKUP AND ARM ASSEMBLIES
33096	Arm—Pickup arm, less crystal and cable (viscoloid-damped type for U-30 and 2nd-production U-129)
31162	Cable—Pickup arm lift cable and clips
33119	Cable—Shielded cable and plug
31156	Crystal—Pickup crystal cartridge and needle screw
33114	Damper—Viscoloid damper for armature (U-30 and 2nd-production U-129)
31159	Pickup and arm complete (without viscoloid damper—for 1st-production U-129)
31160	Screw—Pickup needle screw
31161	Shaft—Pickup pivot arm and shaft assembly
	MOTORBOARD ASSEMBLIES
31149	Base—Tone arm mounting base
32927	Board—Record changer base complete with all welded and riveted posts and bearings (U-30 only)
31152	Board—Record changer base complete with all welded and riveted posts and bearings—less all operating parts (U-129 only)
14209	Bumper—Main lever rubber bumper (1)
9848	Cup—Used needle cup, rest, and lid complete
31148	Escutcheon—Index escutcheon (U-129 only)
32877	Escutcheon—Index escutcheon (U-30 only)
31151	Guide—Pickup lift cable guide (coil spring, 80T 2-in. large) (2)
31150	Mounting—Pickup arm base rubber mounting complete
31155	Spring—Needle cup lid tension spring
	MOTOR ASSEMBLIES (U-129 only)
31617	Bracket—Governor end bearing bracket
31626	Coil—Field coil and laminations for 25 cycle motor
31619	Coil—Field coil and laminations for 50-60 cycle motor
31618	Coil—Field coil and laminations for 60 cycle motor
31624	Governor—Motor governor for 25-cycle motor
11703	Governor—Motor governor for 50-60 cycle motor
31623	Governor—Motor governor for 60-cycle motor
31448	Motor—105-125 volts, 25 cycle (M1)
31163	Motor—105-125 volts, 50-60 cycles (M1)
31157	Motor—105-125 volts, 60 cycles (M1)
30870	Plug—2-contact male plug for motor power cable
31447	Screw—Complete set of motor mounting screws, washers, and spacers—for 25 cycle models only
31158	Screw—Complete set of motor mounting screws, washers, and spacers—for 50-60 cycle models only
31616	Screw—Rotor bearing thrust screw
31620	Screw—Speed regulator screw with nut
31636	Spindle—Spindle and gear for 25 cycle motor
31634	Spindle—Spindle and gear for 50-60 cycle and 60 cycle motors
32913	Spring—Governor spring and ball for 25 cycle motor
32914	Spring—Governor spring and ball for 50-60 cycle motor
32912	Spring—Governor spring and ball for 60 cycle motor
14206	Switch—Motor toggle switch (S7)
31622	Washer—Metal and felt washers for lower spindle bearing
	MOTOR ASSEMBLIES (U-30 only)
31618	Field—Coils and laminations, 105-125 volts, 60 cycle
31619	Field—Coils and laminations, 105-125 volts, 50-60 cycle
31626	Field—Coils and laminations, 105-125 volts, 25 cycle
31623	Governor—60 cycle
11703	Governor—50-60 cycle
31624	Governor—25 cycle
31448	Motor—105-125 volts, 25 cycle (M1)
31163	Motor—105-125 volts, 50-60 cycle (M1)
31157	Motor—105-125 volts, 60 cycle (M1)
30870	Plug—2-contact male plug for motor power cable
31447	Screw—Complete set of motor mounting screws, washers, and spacers—for 25-cycle models only
31158	Screw—Complete set of motor mounting screws, washers, and spacers—for 50-60 cycle models only
31634	Shaft—Turntable shaft and gear—60, and 50-60 cycle
31636	Shaft—Turntable shaft and gear—25 cycle
32875	Switch—Motor toggle switch
32912	Weight—Governor weight and spring—60 cycle
32914	Weight—Governor weight and spring — 50-60 cycle
32913	Weight—Governor weight and spring—25 cycle
	SPEAKER ASSEMBLIES (RL-70H-4)
13866	Cap—Dust cap for cone center
11234	Coil—Field coil (L12)
11469	Coil—Neutralizing coil (L14)
31275	Cone—Speaker cone and voice coil (L13)
31539	Plug—5-contact male plug for speaker
31538	Speaker complete
14534	Transformer—Output transformer (T2)
14357	Washer—Spring washer to hold field coil securely
	MISCELLANEOUS ASSEMBLIES
31358	Button—Station selector push button
13103	Cap—Pilot lamp cap
31456	Cover—8 protective covers for push button markers
31540	Cushion—Chassis mounting cushion and screw assemblies—sufficient for one chassis
31541	Cushion—Motor plate mounting cushion and clamp assembly—sufficient for one instrument
31451	Dial—Station selector dial scale and crystal
31361	Escutcheon—Tuning dial escutcheon, less dial and push buttons
30698	Hinge—Cabinet lid hinge
31542	Indicator—Station selector indicator pointer and carriage
31355	Knob—Station selector, volume control, tone control, or range switch knob
31478	Lid Support—Cabinet lid support
31589	Marker—Station call letter push button markers
31457	Marker—"Victrola" push button marker
31458	Marker—"Dial Tuning" push button marker
32083	Screen—Dial color screen
14270	Spring—Retaining spring for knob, Stock No. 31355
31470	Suspension—Motorboard suspension spring, screw, and lockwasher, 4 required

RCA Victor

VICTROLA MODEL U-43

Chassis No. RC-498E

Two-Band, AC, Superheterodyne Receiver and Phonograph

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.
A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast	550 to 1,550 kc
Short Wave	6 to 18 mc
I-F Frequency	455 kc

TUBE COMPLEMENT

(1) RCA-6SA7 ... 1st Detector-Oscillator
(2) RCA-6K7 ..... I-F Amplifier
(3) RCA-6SQ7 ..... 2nd Detector, AVC, and A-F
(4) RCA-6SF5 ..... Phase Inverter
(5) RCA-6K6GT ..... Power Output
(6) RCA-6K6GT ..... Power Output
(7) RCA-5Y3G ..... Rectifier
(8) RCA-6U5/6G5 ..... Tuning Indicator

POWER OUTPUT

Undistorted	5 watts
Maximum	6 watts

PILOT LAMPS (2)... Mazda No. 44 6.3 volts, 0.25 amps.

POWER SUPPLY RATINGS

A6 ..... 105-125 volts, 60 cycles, 110 watts
A5 ..... 105-125 volts, 50 cycles, 110 watts
B2 ..... 105-125 volts, 25 cycles, 110 watts
C6 ..... 105-130/140-160/200-250 volts, 60 cycles, 110 watts
C5 ..... 105-130/140-160/200-250 volts, 50 cycles, 110 watts

LOUDSPEAKER (RL70L1)

Type ..... 12 inch electrodynamic
Voice Coil Impedance at 400 cycles .2.2 ohms

AUTOMATIC PHONOGRAPH

Pickup ..... Crystal
Record Capacity ... Eight 10 inch or seven 12 inch records

Mechanical Specifications

Dimensions	Cabinet	Chassis
Height (inches)	34	2¼
Width (inches)	32	12⅛
Depth (inches)	16¼	5¾
Overall Chassis Height (inches)		7
Weight	80 lbs (net)	110 lbs. (shipping)
Tuning Drive Ratio		10 to 1

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

2. Set the radio-phono switch to "radio" position and accurately tune in the station for which the first button is to be set.

3. Press in push-button rod No. 1 (left) with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Replace the push-button on its shaft.

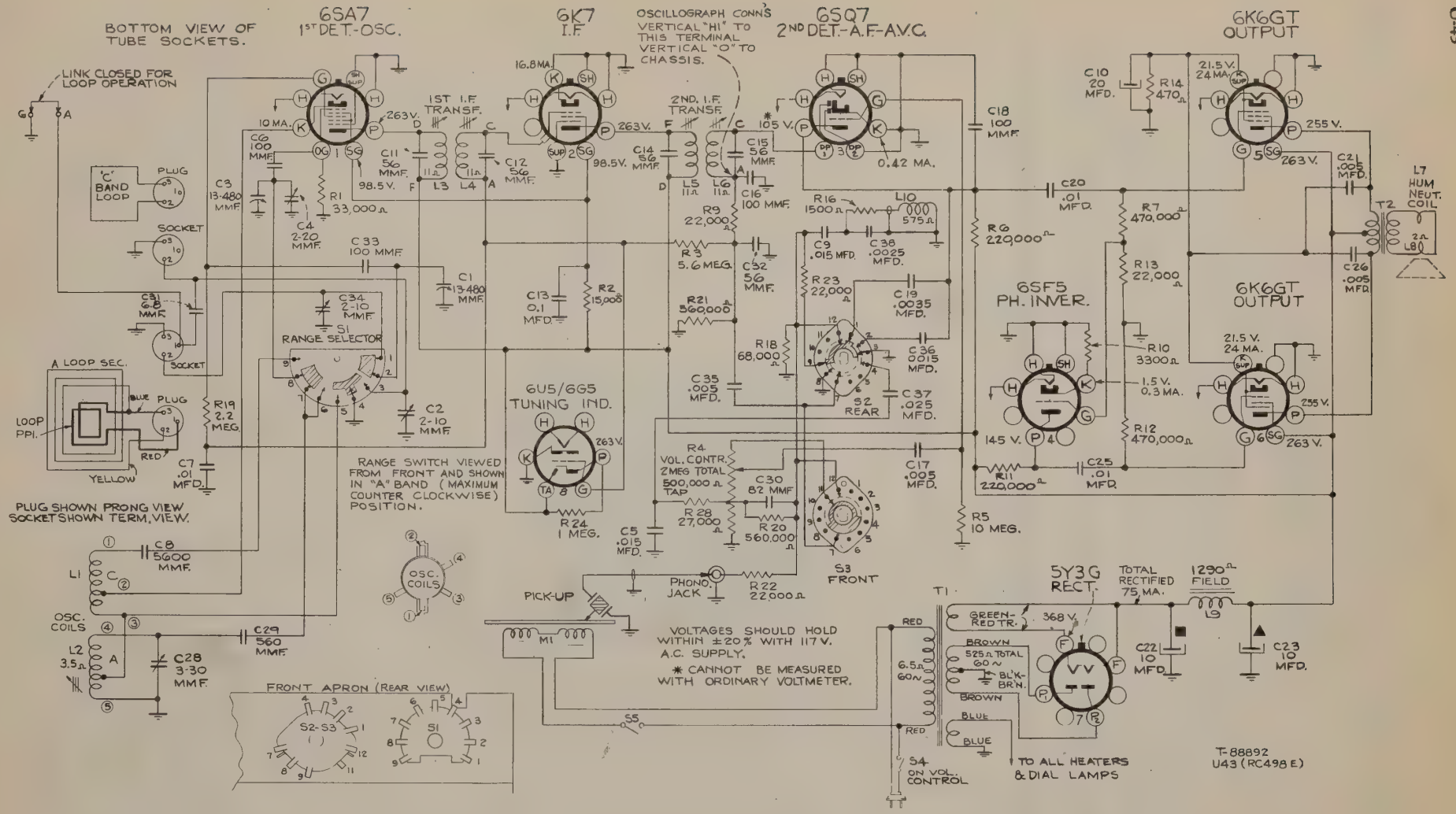
5. Proceed in a similar manner for the remainder of the push-buttons.

6. Insert the station marker tabs in the recesses above the push-buttons.

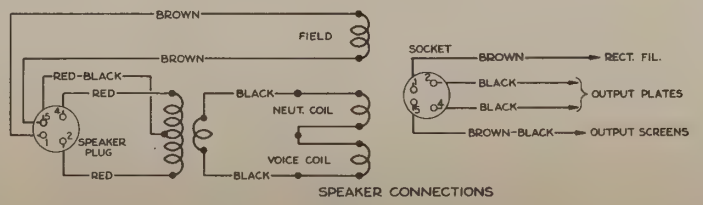
Trademarks "Victrola", "Victor", "RCA Victor" and "Magic Eye" Reg. U. S. Pat. Off. by RCA Mfg. Co. Inc.

First Edition

Printed in U. S. A.

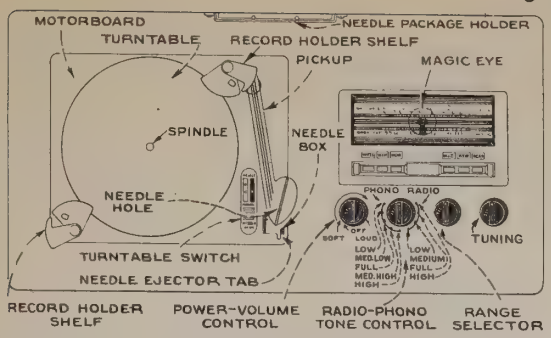


Schematic Circuit Diagram



SPEAKER CONNECTIONS

Alignment Procedure



Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the chassis schematic.

Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

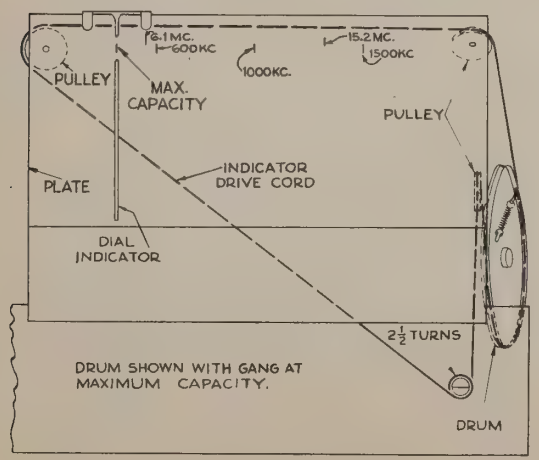
For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect test-osc. output to—	Tune test-osc. to—	Turn radio dial to	Adjust the following for maximum peak output
1	I-F grid through 0.1 mfd capacitor and ground	455 kc	Quiet point between 1,720-1,500 kc	L5 and L6 (2nd I-F trans.)
2	1st det. grid through 0.1 mfd capacitor and ground			L3 and L4 (1st I-F trans.)
3		15.2 mc	15.2 mc	C-4 oscillator*
4	Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver	15.2 mc	Rock at 15.2 mc	C-2 antenna† while rocking
5		6.1 mc	6.1 mc	Spacing between leads from "C" band loop to chassis
6		15.2 mc	Rock at 15.2 mc	C-2 antenna† while rocking
7		1,500 kc	1,500 kc	C-34 antenna C-28 oscillator
8		600 kc	Rock at 600 kc	L-2 oscillator while rocking
9		1,500 kc	1,500 kc	C-34 antenna C-28 oscillator

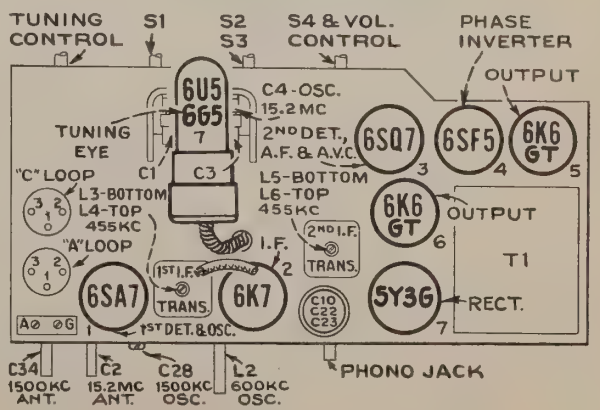
When making adjustments 4 to 9 inclusive the chassis must be in the cabinet, both loops connected, and all leads in their normal positions. When mounting chassis in cabinet if calibration marks on dial plate do not line up with dial scale mounted on cabinet move pointer to agree with dial scale on cabinet.

* Oscillator should track on high frequency side of signal. If two peaks are obtained use high frequency (minimum capacity) peak.

† If two peaks can be obtained use low frequency (maximum capacity) peak.



Dial-Indicator and Drive Mechanism



Tube and Trimmer Locations

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-498E)
33719	Belt—Push button station setting belt
34724	Board—"Antenna-Ground" board
30766	Cap—Rubber cap for tuning indicator
34852	Capacitor — Trimmer — comprising 1 section of 3-30 mmfd. and 2 sections of 2-10 mmfd. (C2, C4, C28)
12813	Capacitor—82 mmfd. (C30)
12720	Capacitor—100 mmfd. (C6, C16, C18, C33)
33806	Capacitor—.0015 mfd. (C36)
34459	Capacitor—.0025 mfd. (C38)
30303	Capacitor—.0035 mfd. (C19)
4870	Capacitor—.025 mfd. (C37)
32240	Capacitor—Electrolytic—comprising 2 sections of 10 mfd. and 1 section of 20 mfd. (C10, C22, C23)
34285	Clip—Clip and thumb screw for tuning indicator
35739	Coil—Choke coil
32707	Coil—Oscillator coil (L1, L2)
35738	Control—Tone control
34721	Control—Volume control and power switch (R4, S4)
32634	Cord—Tuning condenser drive cord
34853	Core—Adjustable core and stud for oscillator coil
33633	Indicator—Station selector indicator
11891	Lamp—Dial lamp
35737	Plate—Dial plate
30868	Plug—2-contact female plug for motor lead
5040	Plug—4-contact female plug for speaker leads
14499	Resistor—1,500 ohms, ½ watt (R16)
13998	Resistor—22,000 ohms, ½ watt (R9, R13, R22, R23)
12738	Resistor—27,000 ohms, ½ watt (R8)
13715	Resistor—68,000 ohms, ½ watt (R18)
12013	Resistor—1 meg., 1/10 watt (R24)
33735	Screw—Push arm adjusting screw
34411	Shaft—Tuning condenser drive shaft
34723	Socket—3-contact socket for antenna loop
31364	Socket—Dial lamp socket
33742	Socket—Phonograph input socket
13871	Socket—Tuning indicator socket
31319	Socket—Tube socket
30585	Spring—Drive cord spring
34726	Spring—Push arm return spring, .018 dia. wire.
34722	Switch—Range switch (S1)
32263	Transformer—First i-f transformer (L3, L4, C11, C12)
34719	Transformer—Second i-f transformer (L5, L6, C14, C15)
31445	Transformer—Power transformer, 100-120 volts, 25-60 cycle
34261	Transformer—Power transformer, 105-120 volts, 50-60 cycle (T1)
33726	Washer—Retaining washer for shaft—Stock No. 34411
	RECORD CHANGER PARTS
	See RP-139A—110 volts, 25-50 cycle RP-145 —110 volts, 60 cycle
	SPEAKER ASSEMBLIES (RL-70L1)
13867	Cap—Dust cap
12012	Coil—Field coil
35616	Cone—Cone complete with voice coil
34728	Diffuser—Speaker diffuser
5039	Plug—4-prong male speaker plug
33444	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
35563	Button—Push button
31456	Cover—Protective covers for markers
35468	Decalcomania—Caution decal for record changer
35742	Decalcomania—Control decal
35592	Decalcomania—Control decal
35741	Decalcomania—"RCA-Victrola" decal
35565	Dial—Glass dial scale
35564	Escutcheon — Dial scale and push button escutcheon
34583	Frame—"C" band antenna loop frame
30698	Hinge—Cabinet lid hinge
13103	Jewel—Pilot lamp jewel
34998	Knob—Tuning, volume control, and power switch, range switch or tone control knob
34729	Loop—Antenna loop
33973	Marker—Station selector push button markers
32641	Plug—3-prong plug for antenna loops
35832	Pull—Door pull
11763	Receptacle—Needle card holder
35172	Rubber—Sponge rubber strip for doors
35740	Shade—Compartment lamp shade
14270	Spring—Retaining spring for knob — Stock No. 34998
31470	Spring—Motorboard spring mounting hardware.
30900	Spring—Retaining spring for button—Stock No. 35563
35831	Support—Lid support—L. H.
35830	Support—Lid support—R. H.

For Phonograph Service Data
Refer to RP-139A, RP-145

RCA Victor

VICTROLA MODEL U-44

Chassis No. RC-486-B

Three-Band, AC, Superheterodyne Receiver and Phonograph

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 52—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

TUBE COMPLEMENT

(1)	6SK7	R-F Amplifier
(2)	6SA7	1st Detector, Oscillator
(3)	6SK7	I-F Amplifier
(4)	6H6	2nd Detector, A.V.C.
(5)	6SF5	A-F Amplifier
(6)	6SF5	Phase Inverter
(7)	6F6	Power Output
(8)	6F6	Power Output
(9)	6U5	Tuning Indicator
(10)	5U4-G	Rectifier

POWER OUTPUT RATING

Undistorted	10 watts
Maximum	12 watts

LOUDSPEAKER (RL-70K-3)

Type	12-inch electrodynamic
V.C. Impedance	2.2 ohms at 400 cycles

POWER SUPPLY RATINGS

A-6	105-125 volts, 60 cycles, 137 watts
A-5	105-125 volts, 50 cycles, 137 watts
B-2	105-125 volts, 25 cycles, 137 watts
C-6	105-130/140-160/200-250 volts, 60 cycles, 137 watts
C-5	105-130/140-160/200-250 volts, 50 cycles, 137 watts

PHONOGRAPH

Type	Automatic
Record Capacity	Eight 10-inch or seven 12-inch

FREQUENCY RANGES

Standard Broadcast	540-1,550 kc
Medium Wave	1.5-4.0 mc
Short Wave	5.8-18.0 mc

INTERMEDIATE FREQUENCY ..... 455 kc

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	34	35 3/16	16 3/8
Chassis Base Dimensions (inches)	2 3/4	12 7/16	7
Over-all Chassis Height			6 7/8 inches
Weight			144 lbs. (Shipping), 112 lbs. (Net)
Tuning Drive Ratio			10 to 1

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First Edition

Printed in U. S. A.

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

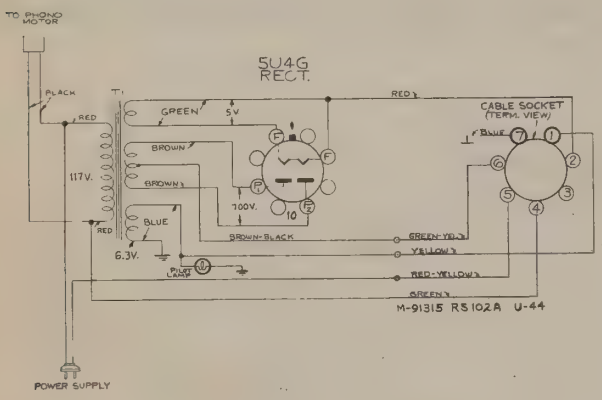
1. Remove station marker tabs; reach through tab holes in escutcheon with small screwdriver and loosen push-button rods.

2. Set the radio-phono-television switch to "radio" position and accurately tune in the station for which the first button is to be set.

3. Press in push-button rod No. 1 with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Proceed in a similar manner for the remainder of the push-buttons.

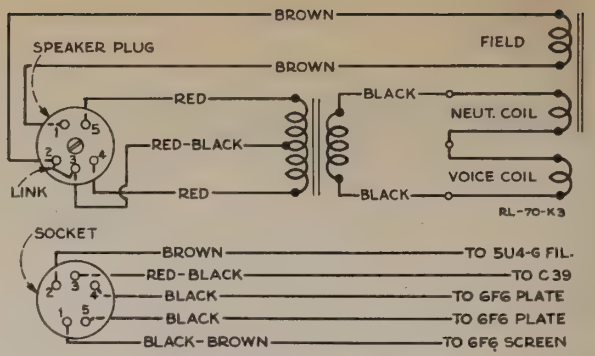
5. Insert the station marker tabs in the recesses adjacent to the push-buttons.



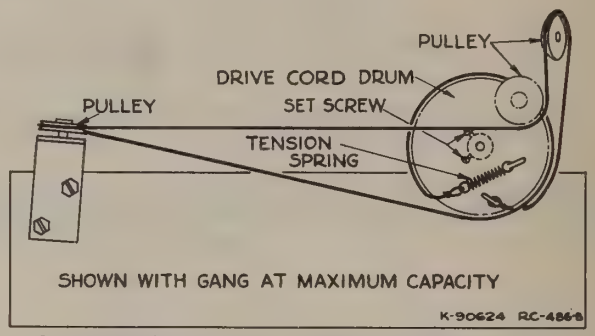
S. P. U. Schematic

Phonograph Information

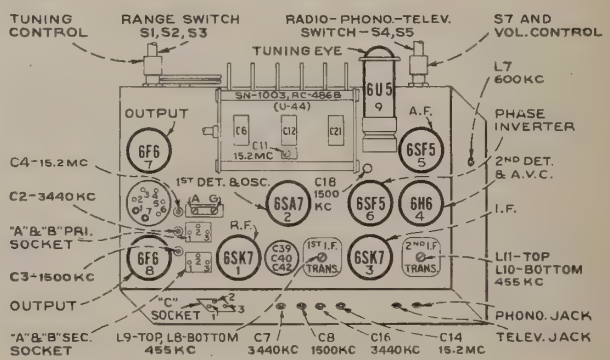
For information regarding the automatic record changer refer to service note No. 41 covering RP-139-A and RP-145 record changers.



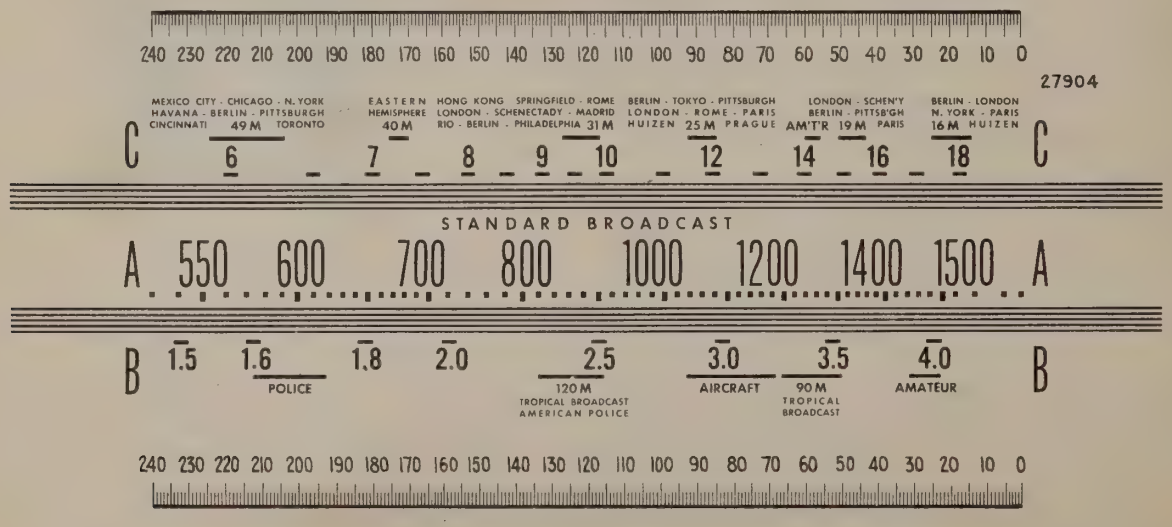
SPEAKER PLUG CONNECTIONS



DIAL INDICATOR DRIVE CORD ARRANGEMENT



Tube and Trimmer Locations


240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
27904
MEXICO CITY · CHICAGO · N. YORK HAVANA · BERLIN · PITTSBURGH CINCINNATI 49 M TORONTO
EASTERN HEMISPHERE 40 M
HONG KONG SPRINGFIELD · ROME LONDON · SCHENECTADY · MADRID RIO · BERLIN · PHILADELPHIA 31 M
BERLIN · TOKYO · PITTSBURGH LONDON · ROME · PARIS HUIZEN 25 M PRAGUE
LONDON · SCHEN'Y BERLIN · PITTSB'GH AM'T'R 19 M PARIS
BERLIN · LONDON N. YORK · PARIS 16 M HUIZEN
C 6 7 8 9 10 12 14 16 18 C
STANDARD BROADCAST
A 550 600 700 800 1000 1200 1400 1500 A
B 1.5 1.6 1.8 2.0 2.5 3.0 3.5 4.0 B
POLICE
120 M TROPICAL BROADCAST AMERICAN POLICE
AIRCRAFT
90 M TROPICAL BROADCAST
AMATEUR
240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Receiver Dial Scales, and Corresponding 0-240° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example 200° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."

Alignment Procedure

Before proceeding with alignment the following lead dress should be carefully checked:

1. A.C. leads at volume control dressed away from audio leads.
2. C-29 dressed close to chassis.
3. C-48 dressed under volume control.
4. Dress C-44 and 6F6 plate leads away from antenna leads.
5. Leads to phono and television jacks dressed close to end of chassis.
6. Red lead from R.F. coil to range switch short and direct as possible.
7. Leads to loop sockets dressed away from chassis and other leads.
8. Green lead from volume control arm to A.F. grid close to chassis.

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis wiring drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator. — For all alignment operations, keep the output as low as possible to avoid a-v-c action. For the first six steps in alignment the low side of the test-oscillator should be connected to the receiver chassis. Following step 6, the signal must be radiated (see alignment table).

Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 240° mark on the drum scale must be vertical and directly above the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 240° mark on the calibration scale when the plates are fully meshed.

For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 I-F grid in series with .01 mfd.	455 kc	"A" band Quiet point near 600 kc	L10 and L11 (2nd I-F trans.)
2	6SA7 det. grid in series with .01 mfd.			L8 and L9 (1st I-F trans.)
3	6SK7 R-F grid in series with 0.1 mfd.	15.2 mc	15.2 mc (47°) "C" band	C14 (osc.)* C11 (det.)***
4		3.44 mc	3.44 mc (57°) "B" band	C16 (osc.)** C7 (det.)
5		600 kc	600 kc (200°) "A" band	L7 (osc.) Rock gang
6		1,500 kc	1,500 kc (22°) "A" band	C18 (osc.) C8 (det.)
7	Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver	15.2 mc	15.2 mc "C" band	C4 (ant.)
8		6.1 mc	6.1 mc "C" band	Inductance of "C" band loop†
9		Repeat step 7		
10		3.44 mc	3.44 mc "B" band	C2 (ant.)
11		1,500 kc	1,500 kc "A" band	C3 (ant.)
12		600 kc	600 kc "A" band	L7 (osc.) Rock gang
13		1,500 kc	1,500 kc "A" band	C18 (osc.) C8 (det.)

Note.—For steps 7 to 13 inclusive the chassis must be in the cabinet, all loop leads connected and in their normal positions. The dial indicator pointer must be fastened to the drive cord in such a position that it is at the 530 kc mark on "A" scale when the gang condenser plates are fully meshed.

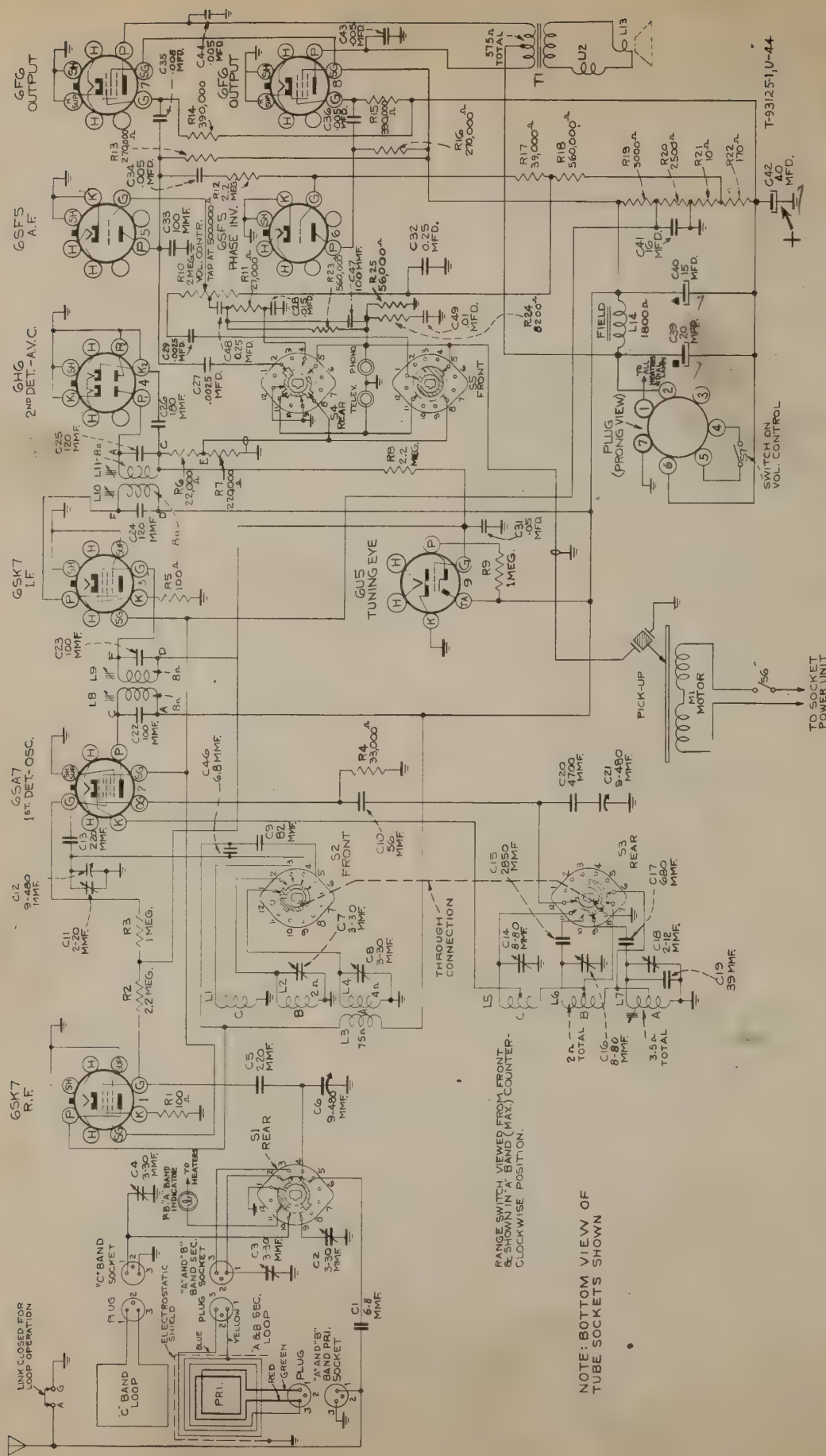
* Use **minimum** capacity peak if two can be obtained. Check to determine that C14 has been adjusted to the correct peak by tuning the receiver to approximately 14.29 mc where a weaker signal should be received.

** Use **minimum** capacity peak if two can be obtained. Check to determine that C16 has been adjusted to the correct peak by tuning the receiver to approximately 2.53 mc where a weaker signal should be received.

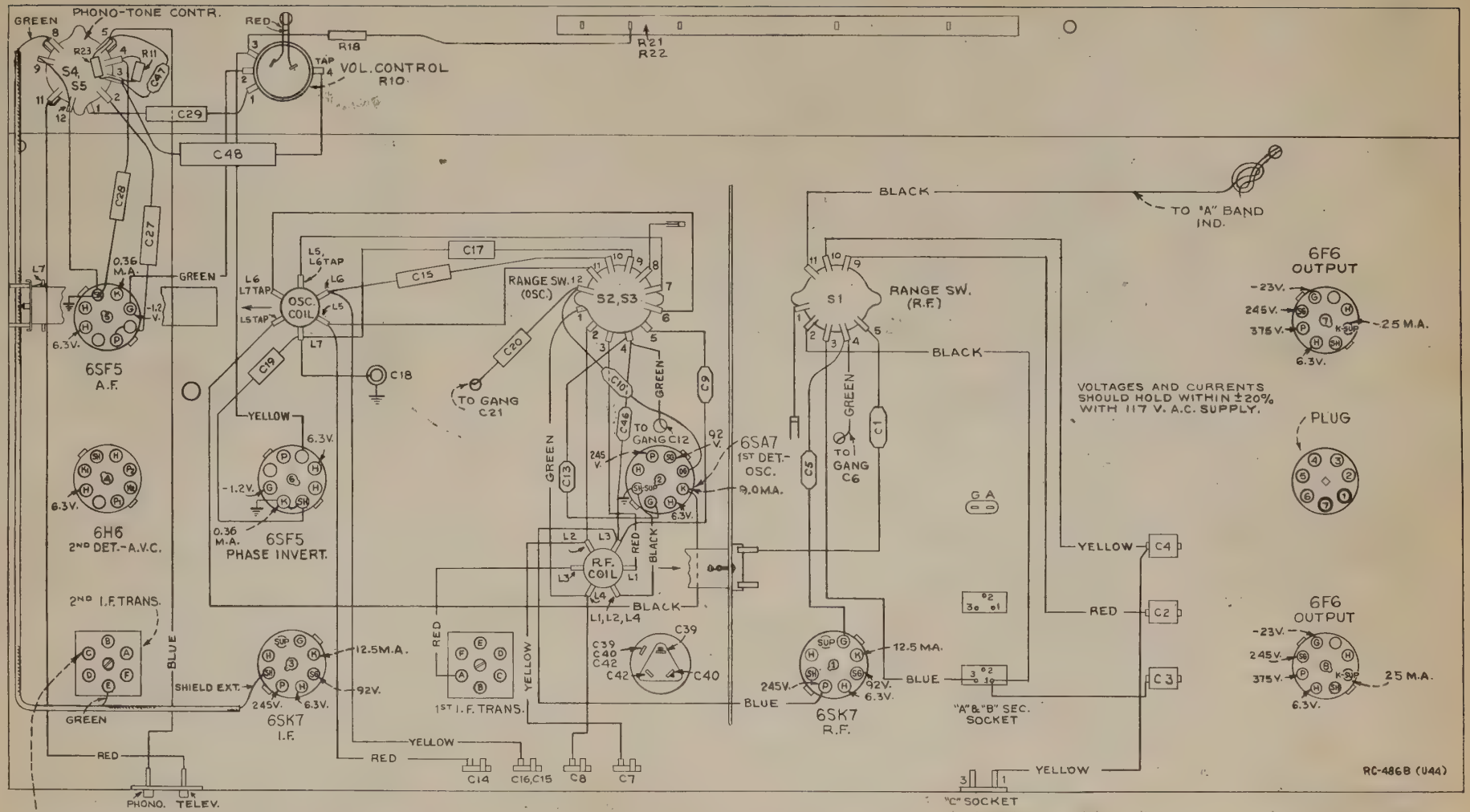
*** Use **maximum** capacity peak if two peaks can be obtained and rock gang condenser while adjusting.

† Adjust the inductance of "C" band loop by varying the spacing between the leads of the loop. Moving the leads closer together decreases the inductance and tunes the loop to a higher frequency; moving the leads farther apart increases the inductance and tunes the loop to a lower frequency.

Important.—The oscillator tracks **above** the signal on all bands.



Chassis Schematic



Chassis Wiring

Antennas

This receiver is equipped with two loop antennas ("C" band horizontal and fixed, and "A" and "B" band vertical, shielded, and rotatable). During installation the "A" and "B" band loop should be rotated to the position giving maximum signal strength and freedom from noise. If desired, an outside antenna and ground can be connected to the terminals provided and when this is done the link between these terminals must be opened. However, for loop operation this link must be closed. If such an antenna is used it should be approximately 100 feet long.

Centering Loudspeaker Cone

The loudspeaker cone centering support is fastened to the field frame by two screws accessible from the rear of the speaker. The cone can usually be recentered by loosening these screws and moving the support around until the proper position is found without disturbing the dust cover. However, in some cases it may be necessary to remove the front dust cover and insert spacers between the voice coil and pole piece in order to obtain proper centering. A new dust cover should then be installed.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-486B)
33620	Arm—Push arm and cam assembly on tuning unit less lock screw
34785	Board—"Antenna-ground" board
33510	Bracket—Drive cord pulleys and bracket (2 pulleys)
34268	Cap—Rubber cap for "Magic Eye"
12714	Capacitor—Air trimmer—2-12 mmfd.
34784	Capacitor—Trimmer comprising 1 section of 3-30 mmfd., 1 section of 2-20 mmfd., and 2 sections of 8-80 mmfd.
34783	Capacitor—Trimmer comprising 3 sections of 3-30 mmfd. each
14079	Capacitor—6.8 mmfd. (C1, C46)
13545	Capacitor—39 mmfd. (C19)
12723	Capacitor—56 mmfd. (C10)
12813	Capacitor—82 mmfd. (C9)
12720	Capacitor—100 mmfd. (C33, C47)
34669	Capacitor—100 mmfd.
34700	Capacitor—120 mmfd.
13003	Capacitor—180 mmfd. (C26)
12694	Capacitor—220 mmfd. (C5, C13)
31552	Capacitor—680 mmfd. (C17)
34787	Capacitor—2,850 mmfd. (C15)
31399	Capacitor—4,700 mmfd. (C20)
34459	Capacitor—.0025 mfd. (C27, C29)
33584	Capacitor—.005 mfd. (C34, C35, C36, C43, C44)
4937	Capacitor—.01 mfd. (C49)
11315	Capacitor—.015 mfd. (C28)
32787	Capacitor—.05 mfd. (C31)
30965	Capacitor—0.25 mfd. (C32, C48)
31323	Capacitor—Electrolytic, 16 mfd. (C41)
34533	Capacitor—Electrolytic comprising 1 section of 20 mfd., 1 section of 15 mfd. and 1 section of 40 mfd.
33508	Clip—"Magic Eye" mounting clip and bracket
34579	Coil—Oscillator coil
34697	Coil—R.F. coil
34780	Control—Volume control and power switch
32634	Cord—Tuning condenser drive cord
32713	Core—Core and stud for Oscillator coil
33627	Drum—Condenser drive drum
34267	Drum—Tuning condenser drive drum
34779	Gear—Gear and cam assembly located on range switch shaft
34532	Gear—Gear sector for range switch
33185	Gear—Volume control gear and hub with set screws
33186	Gear—Volume control knob shaft and gear
11891	Lamp—Dial lamp
12493	Plug—5 contact female plug for speaker cable
14404	Plug—7 contact male plug
35005	Pulley—Drive pulley less bronze drive cord
33509	Pulley—Tuning condenser drive cord pulley and support
34537	Resistor—Voltage divider—1 section of 3,000 ohms, 1 of 2,500 ohms, 1 of 10 ohms, and 1 of 170 ohms
14439	Resistor—100 ohms, ½ watt (R1, R5)
14075	Resistor—8,200 ohms, ½ watt (R24)
13998	Resistor—22,000 ohms, ½ watt (R6)
12738	Resistor—27,000 ohms, ½ watt (R11)
12454	Resistor—33,000 ohms, ½ watt (R4)
12266	Resistor—39,000 ohms, ½ watt (R17)
12286	Resistor—56,000 ohms, ½ watt (R25)
12264	Resistor—220,000 ohms, ½ watt (R7)
12199	Resistor—270,000 ohms, ½ watt (R13, R16)
13479	Resistor—390,000 ohms, ½ watt (R14, R15)
12486	Resistor—560,000 ohms, ½ watt (R18, R23)
13730	Resistor—1 megohm, ½ watt (R3)
12679	Resistor—2.2 megohm, ½ watt (R2, R8, R12)
34040	Ring—Retaining ring for tuning shaft
31611	Screw—No. 8-32 milled head set screw for gear, Stock No. 33185
4669	Screw—No. 8-32 square head set screw for drum, Stock No. 34267 and gear, Stock No. 34779
33621	Screw—Push arm lock screw
14350	Screw—Square head set screw for gear, Stock No. 34532
34778	Shaft—Range switch knob shaft
34038	Shaft—Tuning knob shaft with rubber drive roller and pulley assembled
34575	Socket—2-terminal loop sockets
31365	Socket—Insulated dial lamp socket
31364	Socket—Non-insulated dial lamp socket
33514	Socket—"Phono-Television" input socket
31319	Socket—Tube socket
33544	Spring—Drive cord spring
33622	Spring—Push arm return spring
34042	Spring—Spring and pin for range switch shaft
33515	Spring—Tension spring for spring and pin
34781	Switch—Range switch
34782	Switch—Tone control
34698	Transformer—First i-f transformer
34524	Transformer—Second i-f transformer
33726	Washer—"C" washer for spring and pin, Stock No. 34042
34037	Washer—"C" washer for tuning shaft
	POWER SUPPLY UNIT
11891	Lamp—Pilot lamp
30868	Plug—2-contact female plug for motor cable
14409	Plug—Female plug for power supply to chassis cable
31364	Socket—Pilot lamp socket
31251	Socket—Tube socket
34539	Transformer—Power transformer 105-125 volts, 50-60 cycles
	SPEAKER ASSEMBLIES (RL-70-K3)
31825	Cap—Dust cap
35170	Coil—Speaker field coil
34705	Cone—Cone complete with voice coil
34728	Diffuser—Speaker diffuser
31539	Plug—5-prong male plug for speaker
14534	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
33474	Button—Push button
34791	Dial—Glass dial scale
33549	Escutcheon—Dial and push button escutcheon, less screen and push buttons
34789	Frame—"C" band antenna loop frame only
34792	Gasket—Rubber gasket for motorboard
4585	Hinge—Cabinet door hinges
30698	Hinge—Cabinet lid hinge
34790	Indicator—Station selector indicator and carriage
13103	Jewel—Pilot lamp cap
33470	Knob—Range switch
33553	Knob—Tone control
33471	Knob—Tuning control
33505	Knob—Volume control
34788	Loop—"A" and "B" band antenna loop complete
33842	Marker—Push button station marker
32641	Plug—3-prong plug for antenna loop leads
34794	Pull—Door pull
32427	Receptacle—Packaged needle receptacle
35129	Screen—Compartment lamp screen
33550	Screen—"Push Button 'A' Band" marker screen
34491	Shaft—Pointer carriage guide rod
30330	Spring—Retaining spring for knob, Stock No. 33470
14270	Spring—Retaining spring for knob, Stock No. 33553 and Stock No. 33471
4982	Spring—Retaining spring for knob, Stock No. 33505
31470	Spring—Spring mounting for motorboard
34793	Support—L.H. lid support
34423	Support—R.H. lid support

For Record Changer mechanism refer to Service Notes and Parts Lists RP-139A and RP-145.

RCA Victor

VICTROLA MODEL U-45

Chassis No. RC-486-C

Three-Band, AC, Superheterodyne Receiver and Phonograph

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U.S.A.
A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast	540-1,550 kc
Medium Wave	1.5-4.0 mc
Short Wave	5.8-18.0 mc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1)	6SK7	R-F Amplifier
(2)	6SA7	1st Detector, Oscillator
(3)	6SK7	I-F Amplifier
(4)	6H6	2nd Detector, A.V.C.
(5)	6SF5	A-F Amplifier
(6)	6SF5	Phase Inverter
(7)	6F6G	Power Output
(8)	6F6G	Power Output
(9)	6U5/6G5	Tuning Indicator
(10)	5U4-G	Rectifier

POWER OUTPUT RATING

Undistorted	10 watts
Maximum	12 watts

LOUDSPEAKER (RL-70K-6)

Type	12-inch electrodynamic
V.C. Impedance	2.2 ohms at 400 cycles

POWER SUPPLY RATINGS

A-6	105-125 volts, 60 cycles, 165 watts
A-5	105-125 volts, 50 cycles, 165 watts
B-2	105-125 volts, 25 cycles, 165 watts
C6	105-130/140-160/200-250 volts, 60 cycles, 165 watts
C-5	105-130/140-160/200-250 volts, 50 cycles, 165 watts

PHONOGRAPH

Type	Automatic
Record Capacity	Eight 10-inch or seven 12-inch
Pickup	Crystal

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	42½	34½	18
Chassis Base Dimensions (inches)	2¾	12 7/16	7

Over-all Chassis Height ..... 6⅞ inches
Weight ..... 188 lbs. (Shipping), 121 lbs. (Net)
Tuning Drive Ratio ..... 10 to 1

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Remove station marker tabs; reach through tab holes in escutcheon with small screwdriver and loosen push-button rods.

2. Set the radio-phono switch to "radio" position and accurately tune in the station for which the first button is to be set.

3. Press in push-button rod No. 1 with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Proceed in a similar manner for the remainder of the push-buttons.

5. Insert the station marker tabs in the recesses adjacent to the push-buttons.

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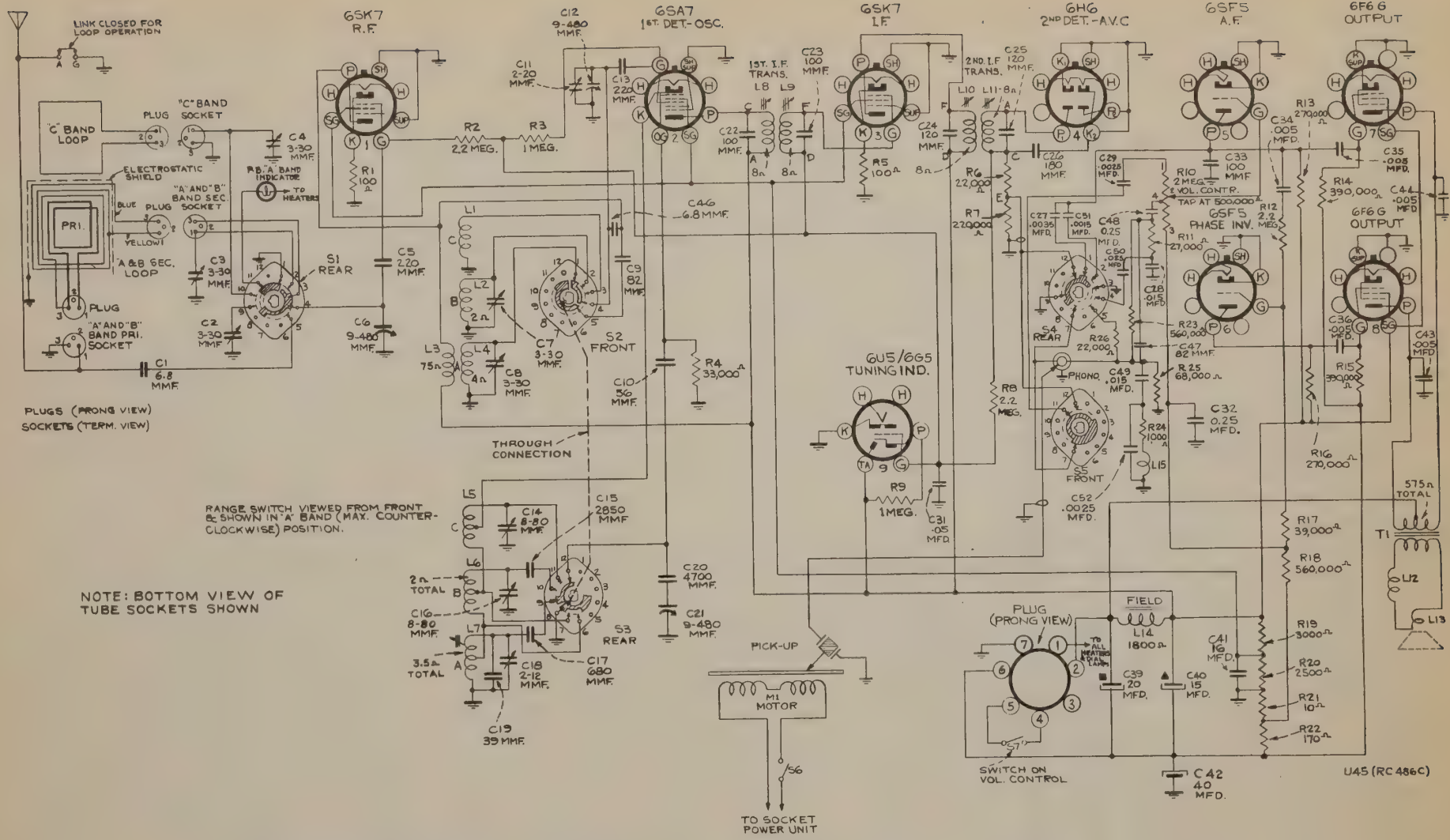
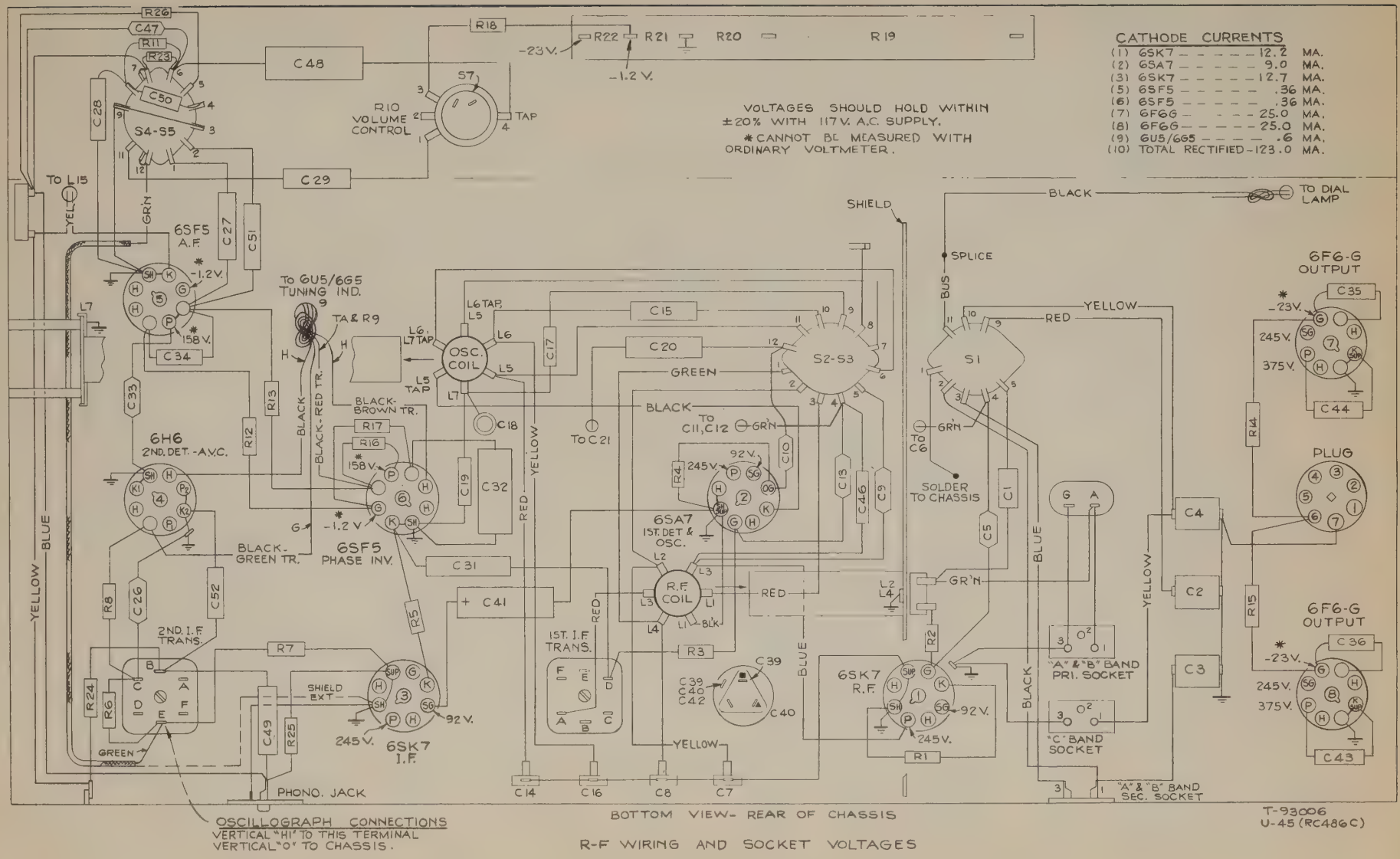
First Edition
Printed in U. S. A.



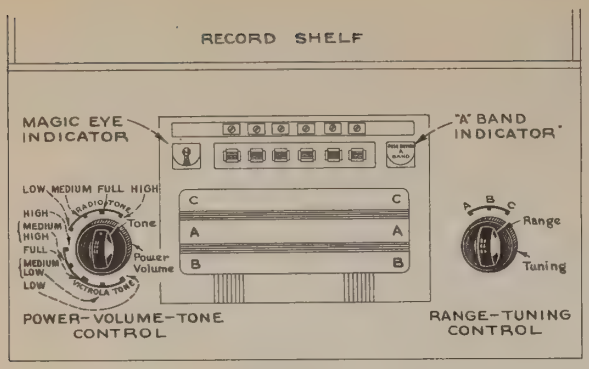
Note: On some receivers R24 is 1,500 ohms, and the connection from the phono plug to terminal 7 on S4 and S5 is made through a 22,000 ohm resister, R27.

Precautionary Lead Dress:

1. A.C. leads at volume control dressed away from audio leads.
2. C-29 dressed close to chassis.
3. C-48 dressed under volume control.
4. Dress C-44 and 6F6-G plate leads away from antenna leads.
5. Leads to phono jack dressed close to end of chassis.
6. Red lead from R.F. coil to range switch short and direct as possible.
7. Leads to loop sockets dressed away from chassis and other leads.
8. Green lead from volume control arm to A.F. grid close to chassis.



R-F WIRING AND SOCKET VOLTAGES



Controls

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis wiring drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator. — For all alignment operations, keep the output as low as possible to avoid a-v-c action. For the first six steps in alignment the low side of the test-oscillator should be connected to the receiver chassis. Following step 6, the signal must be radiated (see alignment table).

Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 240° mark on the drum scale must be vertical and directly above the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 240° mark on the calibration scale when the plates are fully meshed.

For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 I-F grid in series with .01 mfd.	455 kc	"A" band Quiet point near 600 kc	L10 and L11 (2nd I-F trans.)
2	6SA7 det. grid in series with .01 mfd.			L8 and L9 (1st I-F trans.)
3	6SK7 R-F grid in series with 0.1 mfd.	15.2 mc	15.2 mc (47°) "C" band	C14 (osc.)* C11 (det.)***
4		3.44 mc	3.44 mc (57°) "B" band	C16 (osc.)** C7 (det.)
5		600 kc	600 kc (200°) "A" band	L7 (osc.) Rock gang
6		1,500 kc	1,500 kc (22°) "A" band	C18 (osc.) C8 (det.)
7	Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver	15.2 mc	15.2 mc "C" band	C4 (ant.)
8		6.1 mc	6.1 mc "C" band	Inductance of "C" band loop†
9		Repeat step 7		
10		3.44 mc	3.44 mc "B" band	C2 (ant.)
11		1,500 kc	1,500 kc "A" band	C3 (ant.)
12		600 kc	600 kc "A" band	L7 (osc.) Rock gang
13		1,500 kc	1,500 kc "A" band	C18 (osc.) C8 (det.)

Note.—For steps 7 to 13 inclusive the chassis must be in the cabinet, all loop leads connected and in their normal positions. The dial indicator pointer must be fastened to the drive cord in such a position that it is at the 530 kc mark on "A" scale when the gang condenser plates are fully meshed.

* Use **minimum** capacity peak if two can be obtained. Check to determine that C14 has been adjusted to the correct peak by tuning the receiver to approximately 14.29 mc where a weaker signal should be received.

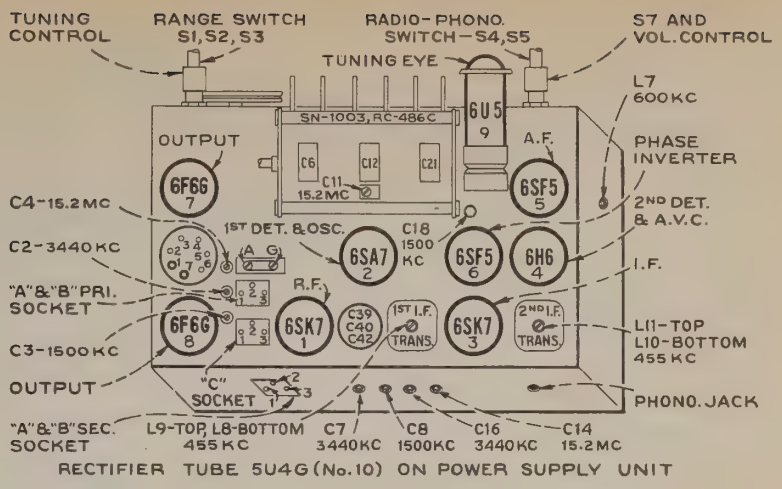
** Use **minimum** capacity peak if two can be obtained. Check to determine that C16 has been adjusted to the correct peak by tuning the receiver to approximately 2.53 mc where a weaker signal should be received.

*** Use **maximum** capacity peak if two peaks can be obtained and rock gang condenser while adjusting.

† Adjust the inductance of "C" band loop by varying the spacing between the leads of the loop. Moving the leads closer together decreases the inductance and tunes the loop to a higher frequency; moving the leads farther apart increases the inductance and tunes the loop to a lower frequency.

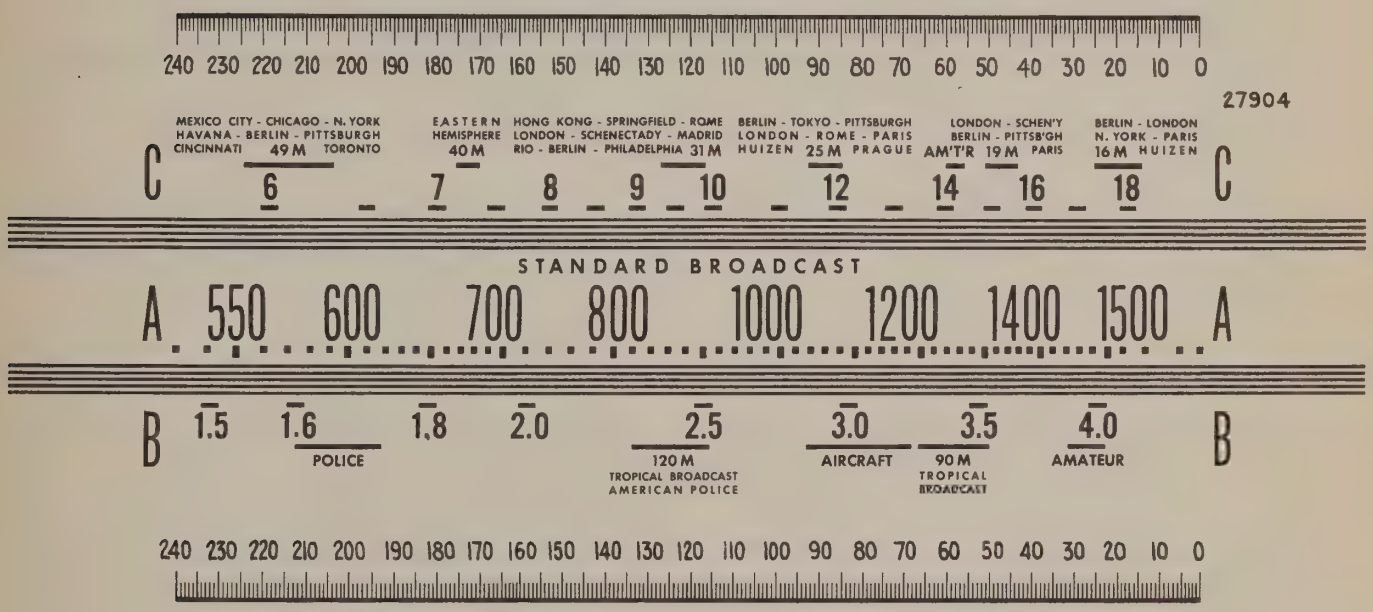
Important.—The oscillator tracks **above** the signal on all bands.

Model U-45



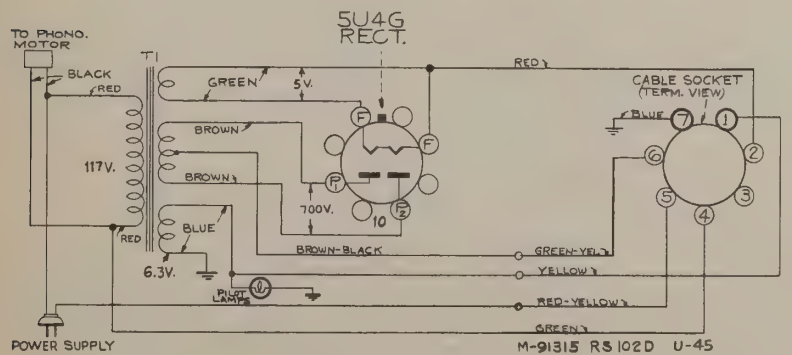
Tube and Trimmer Locations

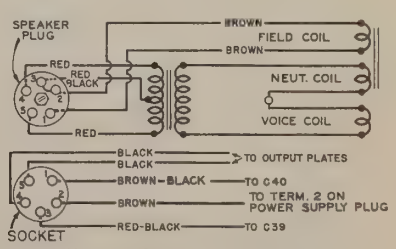
Calibration Scale



Receiver Dial Scales, and Corresponding 0-240° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example 200° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."



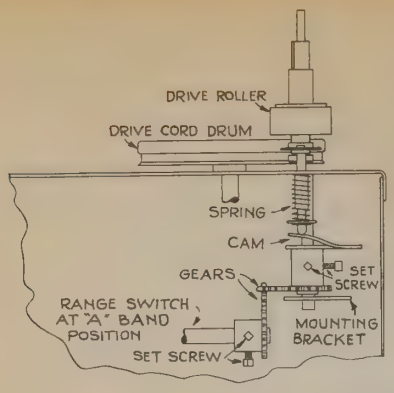


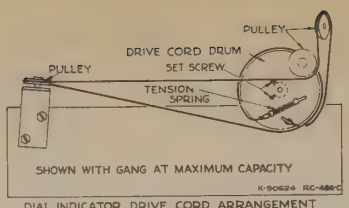
Above—Speaker Connections

At Left—S. P. U. Schematic

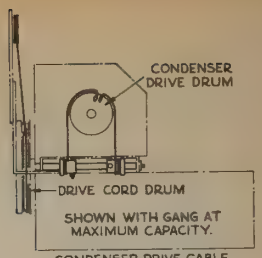
Phonograph Information

For information regarding the automatic record changer refer to service note covering RP-139-A and RP-145 record changers. Model U-45 uses the RP-139-A mechanism.





DIAL INDICATOR DRIVE CORD ARRANGEMENT



CONDENSER DRIVE CABLE ARRANGEMENT

Note: Adjustment of the cam should be such that in "A" band position when push-buttons are operated, the drive cord drum will turn freely without rubbing or binding against the drive roller.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-486C)
33620	Arm—Push arm and cam assembly on tuning unit—less lock screw
34785	Board—"Antenna-ground" board
33510	Bracket—Drive cord pulleys and bracket (2 pulleys)
34268	Cap—Rubber cap for "Magic Eye"
12714	Capacitor—Air-trimmer, 2-12 mmfd.
34784	Capacitor—Trimmer, comprising 1 section of 3-30 mmfd., 1 section of 2-20 mmfd., and 2 sections of 8-80 mmfd.
34783	Capacitor—Trimmer, comprising 3 sections of 3-30 mmfd. each
14079	Capacitor—6.8 mmfd. (C1, C46)
13545	Capacitor—39 mmfd. (C19)
12723	Capacitor—56 mmfd. (C10)
12813	Capacitor—82 mmfd. (C9, C47)
12720	Capacitor—100 mmfd. (C33)
13003	Capacitor—180 mmfd. (C26)
12694	Capacitor—220 mmfd. (C5, C13)
31552	Capacitor—680 mmfd. (C17)
34787	Capacitor—2,850 mmfd. (C15)
31399	Capacitor—4,700 mmfd. (C20)
33806	Capacitor—.0015 mfd. (C51)
34459	Capacitor—.0025 mfd. (C29, C52)
30303	Capacitor—.0035 mfd. (C27)
33584	Capacitor—.005 mfd. (C34, C35, C36, C43, C44)
11315	Capacitor—.015 mfd. (C28, C49)
4870	Capacitor—.025 mfd. (C50)
32787	Capacitor—.05 mfd. (C31)
30965	Capacitor—0.25 mfd. (C32, C48)
31323	Capacitor—Electrolytic, 16 mfd. (C41)
34533	Capacitor—Electrolytic, comprising 1 section of 20 mfd., 1 section of 15 mfd. and 1 section of 40 mfd.
33508	Clip—"Magic Eye" mounting clip and bracket
35687	Coil—Choke coil
34579	Coil—Oscillator coil
34697	Coil—R.F. coil
35686	Control—Tone control
34780	Control—Volume control and power switch
32634	Cord—Tuning condenser drive cord
32713	Core—Core and stud for oscillator coil
33627	Drum—Condenser drive drum
34267	Drum—Tuning condenser drive drum
34779	Gear—Gear and cam assembly located on range switch shaft
34532	Gear—Gear sector for range switch
33185	Gear—Volume control gear and hub with set screws
33186	Gear—Volume control knob shaft and gear
11891	Lamp—Dial lamp
12493	Plug—5-contact female plug for speaker cable
14404	Plug—7-contact male plug
35005	Pulley—Drive pulley—less bronze drive cord
33509	Pulley—Tuning condenser drive cord pulley and support
34537	Resistor—Voltage divider—1 section of 3,000 ohms, 1 of 2,500 ohms, 1 of 10 ohms, and 1 of 170 ohms
14439	Resistor—100 ohms, ½ watt (R1, R5)
14499	Resistor—1,500 ohms, ½ watt (R24)
13998	Resistor—22,000 ohms, ½ watt (R6, R26, R27)
12738	Resistor—27,000 ohms, ½ watt (R11)
12454	Resistor—33,000 ohms, ½ watt (R4)
12266	Resistor—39,000 ohms, ½ watt (R17)
13715	Resistor—68,000 ohms, ½ watt (R25)
12264	Resistor—220,000 ohms, ½ watt (R7)
12199	Resistor—270,000 ohms, ½ watt (R13, R16)
13479	Resistor—390,000 ohms, ½ watt (R14, R15)
12486	Resistor—560,000 ohms, ½ watt (R18, R23)
12013	Resistor—1 meg., 1/10 watt
13730	Resistor—1 meg., ½ watt (R3)
12679	Resistor—2.2 meg., ½ watt (R2, R8, R12)
34040	Ring—Retaining ring for tuning shaft
31611	Screw—No. 8-32 milled head set screw for gear, Stock No. 33185
14350	Screw—No. 8-32 sq. hd. set screw for drum, Stock No. 34267, and gears, Stock Nos. 34779 and 34532
33621	Screw—Push arm lock screw
34778	Shaft—Range switch knob shaft
34038	Shaft—Tuning knob shaft with rubber drive roller and pulley, assembled
34575	Socket—2-terminal loop sockets
31365	Socket—Insulated dial lamp socket
31364	Socket—Non-insulated dial lamp socket
33742	Socket—"Phono" input socket
34864	Socket—Tuning indicator socket
31319	Socket—Tube socket
33544	Spring—Drive cord spring
33622	Spring—Push arm return spring
34042	Spring—Spring and pin for range switch shaft
33515	Spring—Tension spring for spring and pin
34781	Switch—Range switch
34698	Transformer—First i-f transformer
34524	Transformer—Second i-f transformer
34693	Transformer—Power transformer, 110 volts, 25 cycle
33726	Washer—"C" washer for spring and pin, Stock No. 34042
34037	Washer—"C" washer for tuning shaft
	RECORD CHANGER PARTS
	Same as RP-139A
	POWER SUPPLY ASSEMBLIES
11891	Lamp—Indicator lamp
30868	Plug—2-contact female plug for motor lead
14409	Plug—7-contact female plug for power input cable
31364	Socket—Indicator lamp socket
31251	Socket—Tube socket
34693	Transformer—Power transformer—110 volts, 25 cycle
34539	Transformer—Power transformer—110 volts, 60 cycle
	SPEAKER ASSEMBLIES (RL-70K6)
13867	Cap—Dust cap
35170	Coil—Field coil
35616	Cone—Cone, complete with voice coil
34728	Diffuser—Speaker diffuser
31539	Plug—5-prong male speaker plug
14534	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
34994	Button—Push button
13103	Cap—Pilot lamp cap
35743	Decalcomania—Band switch decal
35468	Decalcomania—Caution decal. for record changer
35744	Decalcomania—"Power-Volume" decal
35467	Decalcomania—"RCA-Victrola" decal
35741	Decalcomania—"RCA-Victrola" decal
35393	Decalcomania—"Television" decal
35691	Dial—Glass dial scale
35455	Escutcheon—Dial scale and push button escutcheon—less scale and buttons
35690	Frame—Dial frame, complete—less dial scale, pointer and pointer guide rods
34789	Frame—Frame only for "C" band loop
34792	Gasket—Rubber gasket for motorboard
4585	Hinge—1 set of bottom door hinges
34871	Hinge—Top door hinge—L. H.
34870	Hinge—Top door hinge—R. H.
34790	Indicator—Station selector indicator and carriage
35458	Knob—Range switch knob
35459	Knob—Tone control knob
35460	Knob—Tuning knob
35461	Knob—Volume control and power switch knob
5117	Lamp—Compartment lamp
35689	Loop—"A" and "B" band antenna loop, complete
33842	Markers—Station selector markers
31470	Mounting—Motorboard spring mounting
34990	Plug—2-prong male plug for "C" band loop
32641	Plug—3-prong male plug for "A" and "B" band loops
35042	Pull—Door pull
32427	Receptacle—Packaged needle holder
33550	Screen—"Push Button 'A' Band" marker screen
35688	Shade—Compartment lamp shade
34491	Shaft—Pointer guide shaft
31364	Socket—Compartment lamp socket
4982	Spring—Retaining spring for knob, Stock No. 35461
14270	Spring—Retaining spring for knob, Stock Nos. 35459 and 35460
30330	Spring—Retaining spring for knob, Stock No. 35458

RCA Victor

VICTROLA MODEL U-46

Chassis No. RC-501

and

MODEL K-130

Chassis No. RC-501A

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 57—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast	540-1,560 kc
Medium Wave	1.55-4.0 mc
Short Wave	5.8-18.0 mc
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1)	RCA-6SK7	R-F Amplifier
(2)	RCA-6SA7	1st Det., Oscillator
(3)	RCA-6SK7	I-F Amplifier
(4)	RCA-6H6	2nd Det., A.V.C.
(5)	RCA-6SF5	A-F Amplifier
(6)	RCA-6SF5	Phase Inverter
(7)	RCA-6F6-G	Power Output
(8)	RCA-6F6-G	Power Output
(9)	RCA-6F6-G	Power Output
(10)	RCA-6F6-G	Power Output
(11)	RCA-6U5/6G5	Tuning Indicator
(12)	RCA-5U4-G	Rectifiers in Power Supply Unit.
(13)	RCA-5U4-G	

POWER OUTPUT RATING

Undistorted	20 watts
Maximum	22 watts

LOUDSPEAKER (RL-76B-5)

Type	12-inch electrodynamic
V.C. Impedance	11.5 ohms at 400 cycles

POWER SUPPLY RATINGS K-130 (U-46, 50 watts additional)

Rating A	105-125 volts, 50-60 cycles, 200 watts
Rating B	105-125 volts, 25-60 cycles, 200 watts
Rating C	105-130, 140-160, 200-250 volts, 40-60 cycles, 200 watts

PHONOGRAPH (Model U-46 only)

Type	Automatic
Record Capacity	Eight 10-inch or Seven 12-inch
Turntable Speed	78 r.p.m. (Adjustable)
Type Pickup	Crystal
Pickup Impedance	100,000 ohms at 1,000 cycles

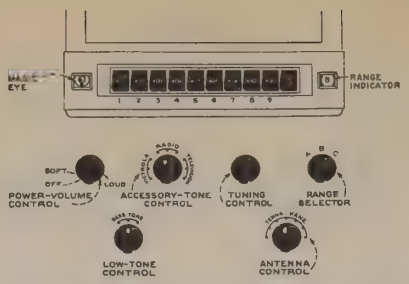
Mechanical Specifications

	Model K-130	Model U-46
Height (inches)	44	44
Width (inches)	32 3/8	37 7/8
Depth (inches)	17	17 15/32
Weight (shipping lbs.)	140	218
Chassis Dimensions (inches)		15 3/4 x 8 1/2 x 3 1/2
Over-all Chassis Height (inches)		8 7/8
Tuning Drive Ratio		18 to 1

Trademarks "Victrola," "RCA Victor" "Victor" and "Magic Eye" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

First Edition

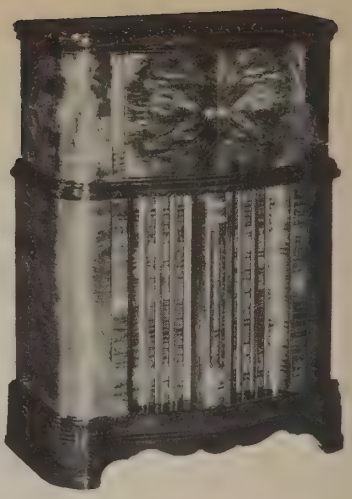
Printed in U. S. A.



Above—Operating Controls

At Right—Model K-130

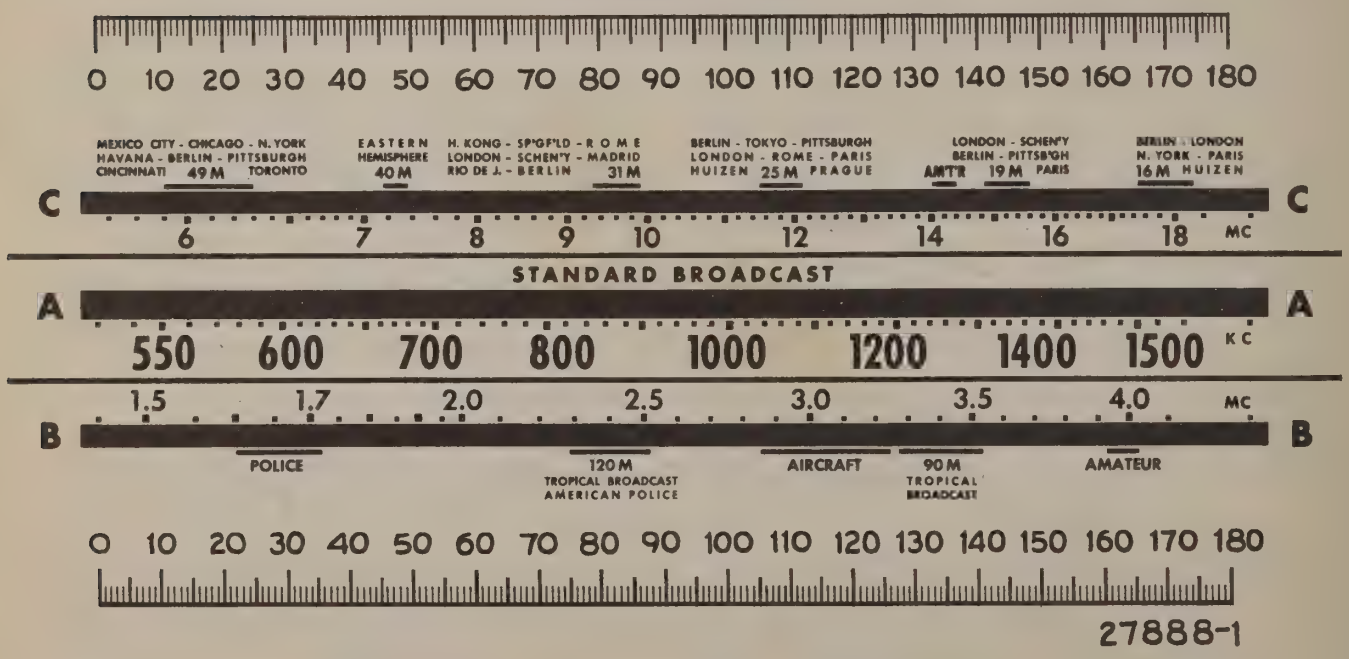
At Left—Model U-46



Adjustments for Electric Tuning

1. Make a list of the desired nine stations, arranged in order from low to high frequencies.
2. Turn range selector to "A" band, turn power on, and allow a few minutes for warming up.
3. Turn "Accessory-Tone Control" to most clockwise "Radio" position.
4. Press down the "dial-tuning" (right-hand) button.
5. Manually tune in the first station on the list, using the "Magic Eye" for accurate tuning.
6. Hold down the "dial-tuning" button, and press down station button No. 1 (at left). Both buttons will stay down, central dial lamp will light brightly or dimly, depending on which side of disc contact is made. Move station-setting contact No. 1 to the insulating line on the disc at rear of gang. When the contact is correctly centered on the insulating line, the central dial lamp will go out.
7. Press down any other button in order to release the dial-tuning button and station button No. 1. Then press down station button No. 1 again. The electric tuning mechanism will function to tune in the station, and the central dial lamp will stay on.
8. Repeat this process for the remaining stations.

Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
MEXICO CITY - CHICAGO - N. YORK
HAVANA - BERLIN - PITTSBURGH
CINCINNATI 49 M TORONTO
EASTERN HEMISPHERE 40 M
H. KONG - SP'GF'LD - R O M E
LONDON - SCHEN'Y - MADRID
RIO DE J. - BERLIN 31 M
BERLIN - TOKYO - PITTSBURGH
LONDON - ROME - PARIS
HUIZEN 25 M PRAGUE
LONDON - SCHEN'Y
BERLIN - PITTSB'GH
AM'TR 19 M PARIS
BERLIN - LONDON
N. YORK - PARIS
16 M HUIZEN
C
C
6 7 8 9 10 12 14 16 18 MC
STANDARD BROADCAST
A
A
550 600 700 800 1000 1200 1400 1500 KC
1.5 1.7 2.0 2.5 3.0 3.5 4.0 MC
B
B
POLICE
120 M
TROPICAL BROADCAST
AMERICAN POLICE
AIRCRAFT
90 M
TROPICAL BROADCAST
AMATEUR
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
27888-1

Receiver Dial Scales and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 136° on the calibration scale corresponds approximately to 3.44 mc on the B band scale. Read instructions under "Alignment Procedure."

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action. For the first eight steps in alignment the low side of the test-oscillator should be connected to the receiver chassis. Following step 8, the signal must be radiated.

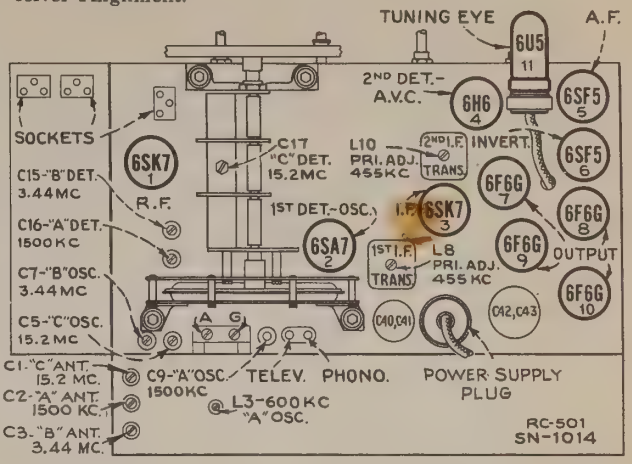
Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during the first eight steps of alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical and directly under the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

For additional details, refer to booklet "RCA Victor Receiver Alignment."



Tube and Trimmer Locations

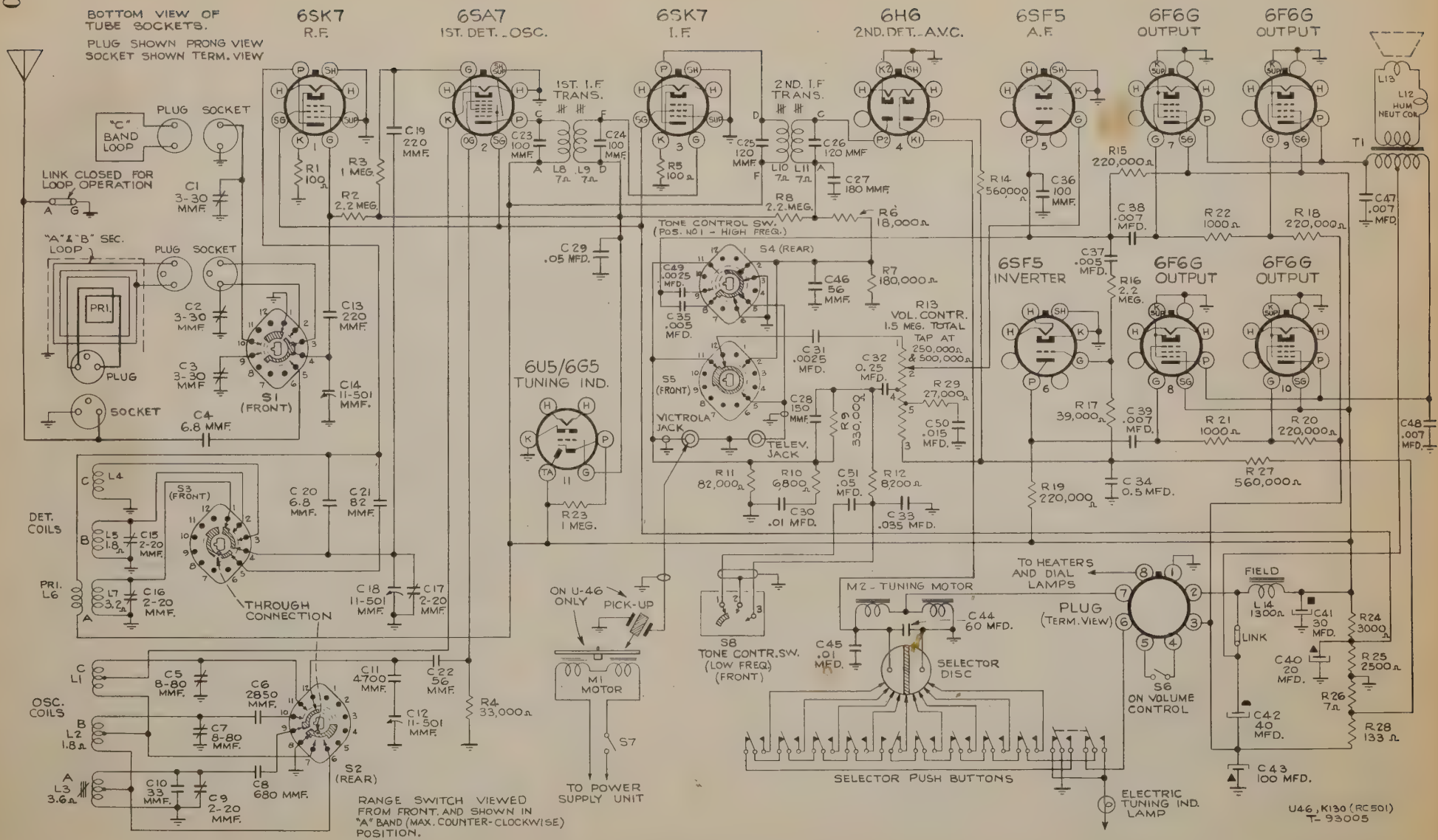
Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6SK7 I-F grid in series with .01 mfd.	455 kc	"A" band quiet point	L10 and L11 (2nd I-F trans.)
2	6SA7 det. grid in series with .01 mfd.			L8 and L9 (1st I-F trans.)
2A	With input to 6SA7 grid, do not re-adjust 2nd I-F trans. after 1st I-F trans. has been adjusted.			
3	Front section of gang in series with .01 mfd.	15.2 mc	"C" band 15.2 mc (144°)	C5 (osc.)* C17 (det.)** Rock gang
4		3.44 mc	"B" band 3.44 mc (136°)	C7 (osc.)* C15 (det.)**
5		600 kc	"A" band 600 kc (29.5°)	L3 (osc.)
6		1,500 kc	"A" band 1,500 kc (165°)	C9 (osc.) C16 (det.)
7		600 kc	"A" band 600 kc (295°)	L3 (osc.) Rock gang
8		Repeat step 6		
9	Following step 8, a radiated signal must be used for the remainder of the alignment. One or two turns of wire forming a loop approximately 18 inches in diameter connected across the output of a test-oscillator such as RCA Model 153, or Stock No. 9595 (TMV-97C), etc., will be suitable. For the adjustments using the radiated signal, the chassis must be placed in the cabinet and the receiver loops connected.	15.2 mc	"C" band; 15.2 mc	C1 (ant.)
10		6.1 mc	"C" band; 6.1 mc	Inductance of "C" band loop†
11		Repeat step 9		
12		3.44 mc	"B" band; 3.44 mc	C3 (ant.)
13		1,500 kc	"A" band; 1,500 kc	C2 (ant.)
14		600 kc	"A" band; 600 kc	L3 (osc.) Rock gang
15		1,500 kc	"A" band; 1,500 kc	C9 (osc.) C16 (det.)

* Use minimum capacity peak if two can be obtained. Check for selection of correct peak by tuning receiver approximately 910 kc lower where a weaker signal should be received.

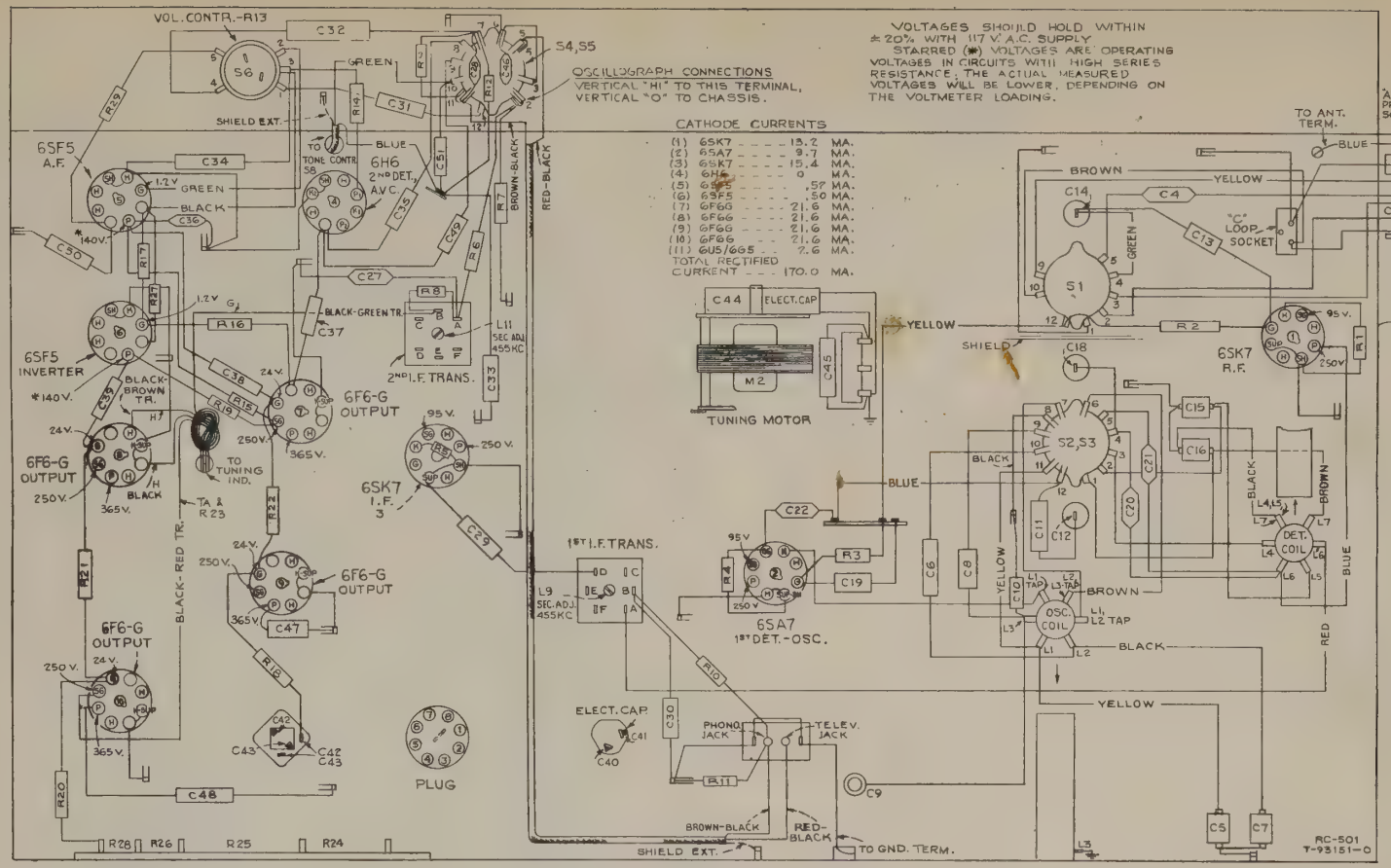
** Use maximum capacity peak if two can be obtained.

† Adjust the inductance of "C" band loop by varying the spacing between the leads of the loop. Moving the leads closer together decreases the inductance and tunes the loop to a higher frequency; moving the leads farther apart increases the inductance and tunes the loop to a lower frequency.

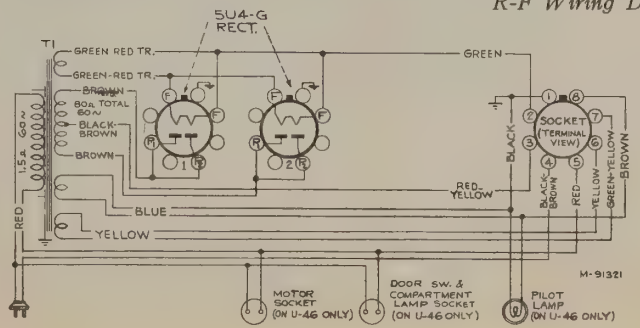
Important.—The oscillator tracks **above** the signal on all bands.



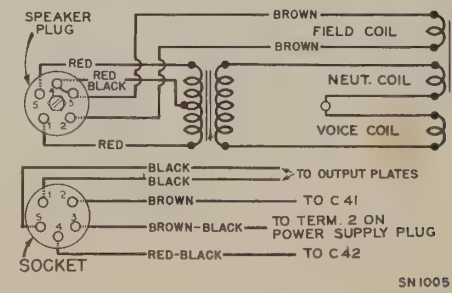
Schematic Circuit Diagram


VOL. CONTR.-R13
S6
SHIELD EXT.
TO TONE CONTR. S8
6SF5 A.F.
6H6 2ND DET. A.V.C.
6SF5 INVERTER
6F6-G OUTPUT
TO TUNING IND.
6SK7 I.F. 3
2ND I.F. TRANS.
1ST I.F. TRANS.
6SA7 1ST DET.-OSC.
TUNING MOTOR
6SK7 R.F.
S1
S2,S3
OSC. COIL
DET. COIL
"C" LOOP SOCKET
TO ANT. TERM.
"A" "B" PRI. LOOP SOCKET
"A" "B" SEC. LOOP SOCKET
ELECT. CAP.
PHONO JACK
TELEV. JACK
PLUG
SHIELD EXT.
TO GND. TERM.
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL, VERTICAL "O" TO CHASSIS.
VOLTAGES SHOULD HOLD WITHIN ±20% WITH 117 V. A.C. SUPPLY
STARRED (*) VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE. THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.
CATHODE CURRENTS
(1) 6SK7 - - - - 13.2 MA.
(2) 6SA7 - - - - 9.7 MA.
(3) 6SK7 - - - - 15.4 MA.
(4) 6H6 - - - - 0 MA.
(5) 6SF5 - - - - .58 MA.
(6) 6SF5 - - - - .50 MA.
(7) 6F6G - - - - 21.6 MA.
(8) 6F6G - - - - 21.6 MA.
(9) 6F6G - - - - 21.6 MA.
(10) 6F6G - - - - 21.6 MA.
(11) 6U5/6G5 - - 7.6 MA.
TOTAL RECTIFIED CURRENT - - - 170.0 MA.
RC-501
T-93151-0

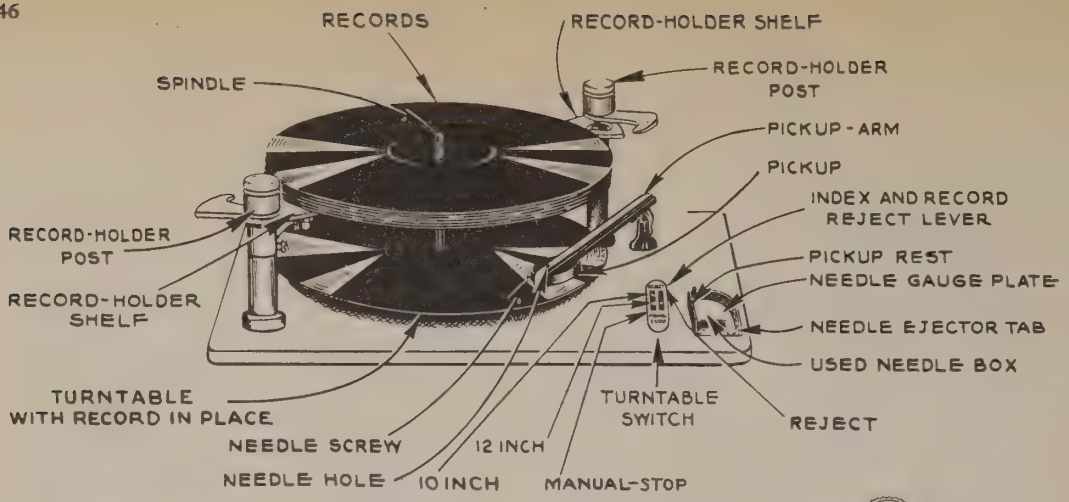
R-F Wiring Diagram and Socket Voltages



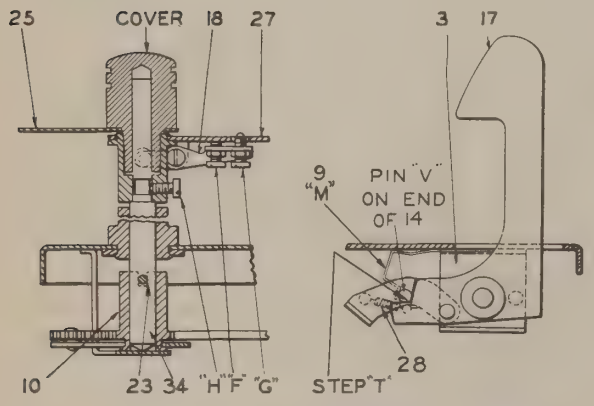
Power Supply Schematic Circuit Diagram



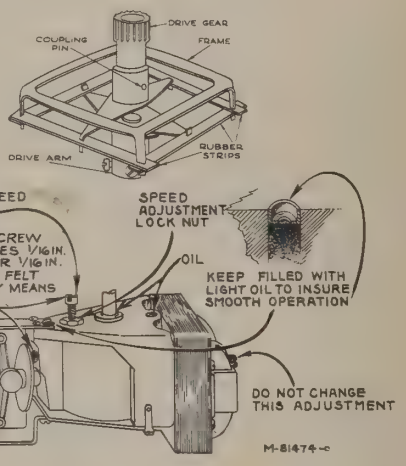
Speaker Plug Connections



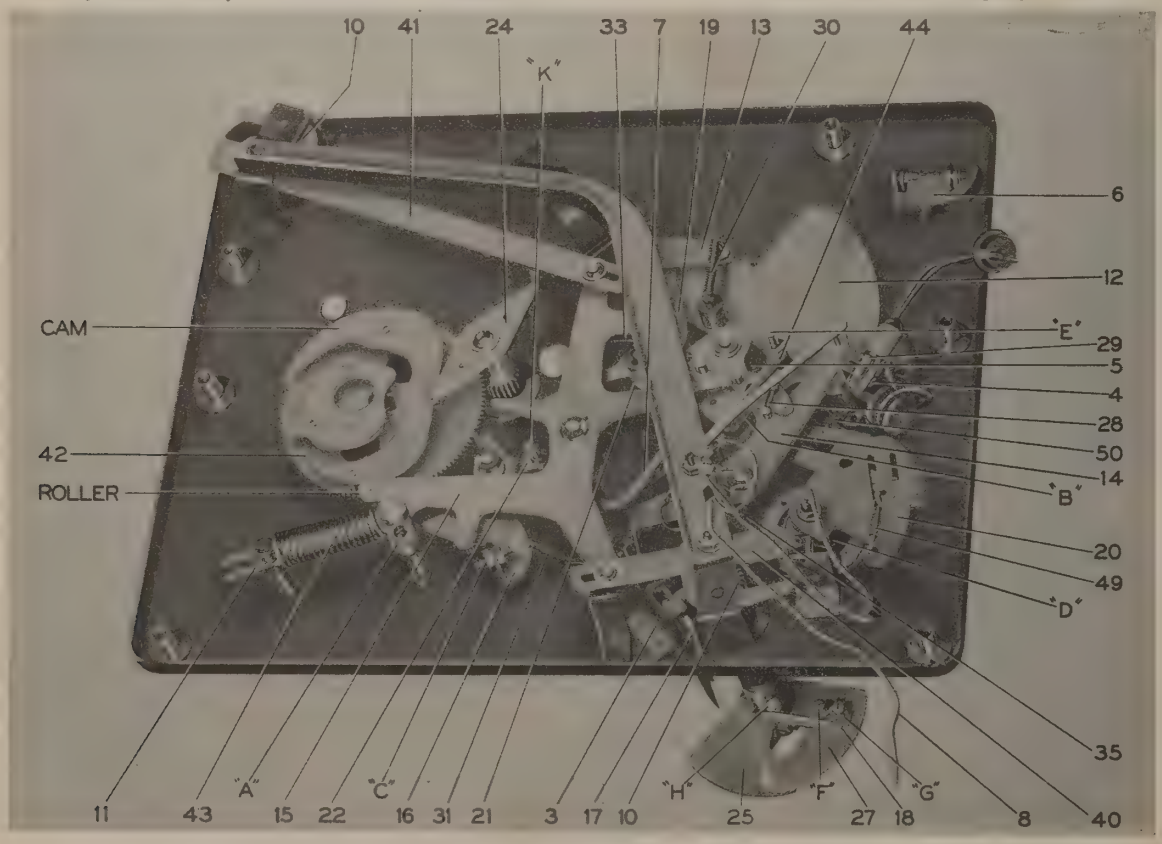
Top View of Automatic Record Changer



Details of Record Shelf Posts and Lever Assemblies


DRIVE GEAR
COUPLING PIN
FRAME
DRIVE ARM
RUBBER STRIPS
SPEED ADJUSTMENT (SCREW) TO DECREASE SPEED TURN CLOCKWISE
SPEED ADJUSTMENT LOCK NUT
TURN ADJUSTMENT SCREW UNTIL FELT PROTRUDES 1/16 IN. ADJUST GOVERNOR FOR 1/16 IN. CLEARANCE BETWEEN FELT AND DISC. SECURE BY MEANS OF SET SCREW.
OIL
KEEP FILLED WITH LIGHT OIL TO INSURE SMOOTH OPERATION
ADJUST SO THAT SHAFT IS FREE TO ROTATE
DO NOT CHANGE THIS ADJUSTMENT
REMOVE TO TAKE OFF GOVERNOR
M-81474-C

Motor Data and Coupling



Bottom View of Automatic Record Changer

NOTE: Numbers refer to parts—letters refer to adjustments.

Automatic Record Changer

(RP-140)

GENERAL INFORMATION

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc. are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and revolving the turntable by hand. Six turntable revolutions are required for one change cycle.

The turntable, spindle, and pinion gear are assembled by means of a 3/32 inch straight pin. This pin may be removed by gently driving with a standard pin punch.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

All records must be absolutely flat for smooth operation.

A pickup shorting switch, located under the motorboard, operates when the pickup is moved outward to the pickup rest.

ADJUSTMENTS

A. Main Lever.—This lever "15" is basically important in that it interlinks the various individual mechanisms which control needle landing, tripping, record separation, etc. Rotate the turntable until the changer is out-of-cycle; and check rubber bumper bracket (A). The roller should clear the nose of the cam plate by approximately 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the record is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pickup is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the trip finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.

C. Pickup Lift Cable Screw.—During the record change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pickup lift cable. To adjust pickup for proper elevation, stop the changer "in-cycle" at the point where pickup is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknuts "C" to obtain 1 inch spacing between needle point and turntable top surface.

D. & E. Needle Landing on Record. — The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10 inch record. Position of eccentric stud "E" governs the landing of the needle on a 12 inch record; this, however, is dependent on the proper 10 inch adjustment.

To adjust for needle landing, place 10 inch record on turntable; push index lever to reject position and return to the 10 inch position; see that pickup locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on the record; then see that pin "V" on lever "14" is in contact with "Step T" on lever "17." The correct point of landing is 4⅞ inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17." Leave approximately 1/32 inch end play between hub of lever "20" and pickup base bearing, and tighten the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone pointed screw "D."

After adjusting for needle landing on a 10 inch record, place 12 inch record on turntable; push index lever to reject and return to 12 inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5⅝ inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be toward the rear of the motorboard, otherwise incorrect landing may occur with 10 inch records.

F. & G. Record Separating Knife. — The upper plate (knife) "25" on each of the record posts serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "27" be accurately maintained. The spacing for the 10 inch record is nominally .055 inch, and for the 12 inch record is .075 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "F" to give .052—.058 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F," adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072—.078 inch.

H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustment be such that the record is released from both shelves at the same instant. To adjust, place a 12 inch record on the turntable, rotate mechanism into cycle to the point where both separating knives have turned clockwise as far as the mechanism will turn them; lift record upward until it is in contact with both separating knives. Then loosen screws "H" and shift record shelves "27" so that the curved inner edges of the shelves are uniformly spaced approximately 1/16 inch from the record edge. Some backlash will be present in the rotation of these shelves. They should be adjusted so that the backlash permits them to move away from the record but not closer than the approximate 1/16 inch specified above. Tighten the blunt nose screw "H," run mechanism through cycle several times to check action, then tighten cone pointed screw "H."

If record shelves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown). — When the changer is out-of-cycle, the front lower edge of the pickup head should be 5/16 inch above surface of motorboard. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication. — Petrolatum or petroleum jelly should be applied to cam and gears of record posts. Apply heavy gear grease, such as "Texaco Crater No. 2" or equivalent to main gear and spindle pinion gear.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motor board.

The felt washer between the turntable and spindle bearing should be soaked in light engine oil whenever the turntable is removed, or as required for proper operation.

Do not allow oil or grease to come in contact with, rubber mounting of tone arm base, rubber bumper, or flexible coupling of drive motor.

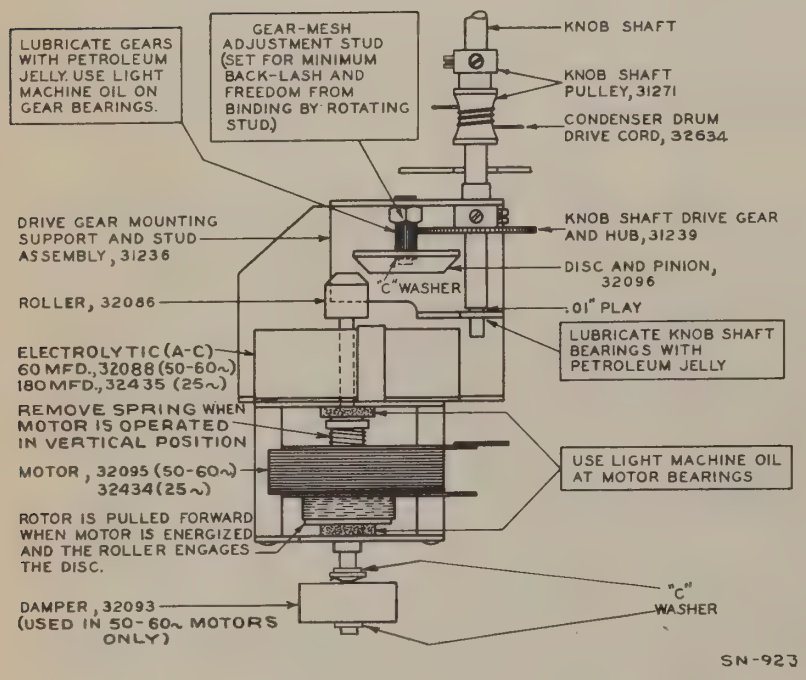
Automatic Record Changer (Continued)

MISCELLANEOUS SERVICE HINTS

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual mis-adjustments will enable ready adjustment in most cases.

1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A."
2. Needle does not land properly on both 10 and 12 inch records—Make complete adjustments "D" and "E."
3. Needle does not land properly on 12 inch record but correct on 10 inch—Effect adjustment "E."
4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B." Also, see that levers "7" and "12" are free to move without touching each other.
5. Pickup strikes lower record of stack or drags across top record on turntable—Adjust lift cable per adjustment "C."
6. Needle does not track after landing—Friction clutch "5" adjustment "B" may be too tight; bind in tone arm vertical bearing; levers "7" and "12" fouled; or pickup output cable twisted.
7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.
8. Wow in record reproduction — Record is defective; flexible coupling between motor and changer mechanism not correctly assembled; or instrument is not being operated at normal room temperature (65° F).
9. Record knives strike edge of records—Records warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.
10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H."
11. Needle lands in 10 inch position on 12 inch record or misses record when playing both types mixed—Increase tension of pickup locating lever spring "9."

Electric Tuning Mechanism


LUBRICATE GEARS WITH PETROLEUM JELLY. USE LIGHT MACHINE OIL ON GEAR BEARINGS.
GEAR-MESH ADJUSTMENT STUD (SET FOR MINIMUM BACK-LASH AND FREEDOM FROM BINDING BY ROTATING STUD.)
KNOB SHAFT
KNOB SHAFT PULLEY, 31271
CONDENSER DRUM DRIVE CORD, 32634
DRIVE GEAR MOUNTING SUPPORT AND STUD ASSEMBLY, 31236
KNOB SHAFT DRIVE GEAR AND HUB, 31239
"C" WASHER
DISC AND PINION, 32096
ROLLER, 32086
.01" PLAY
LUBRICATE KNOB SHAFT BEARINGS WITH PETROLEUM JELLY
ELECTROLYTIC (A-C) 60 MFD., 32088 (50-60~) 180 MFD., 32435 (25~)
REMOVE SPRING WHEN MOTOR IS OPERATED IN VERTICAL POSITION
MOTOR, 32095 (50-60~) 32434 (25~)
USE LIGHT MACHINE OIL AT MOTOR BEARINGS
ROTOR IS PULLED FORWARD WHEN MOTOR IS ENERGIZED AND THE ROLLER ENGAGES THE DISC.
"C" WASHER
DAMPER, 32093 (USED IN 50-60~ MOTORS ONLY)
SN-923

When a station button is pushed in, it completes the 24-volt circuit through the corresponding station-setting contact and one-half of the brass selector disc, which is connected to one side of the motor field coil. This energizes the motor, and the rotor is pulled forward, engaging with the gear train that drives the tuning condenser and selector disc. The condenser and disc rotate until the insulation line comes under the particular station-setting contact, and the motor circuit is broken.

When the electric tuning mechanism is in action, the motor-supply voltage is fed into a diode rectifier circuit which applies a high bias to the first-audio amplifier. This prevents audio amplification and makes the set quiet or "mute" while the mechanism is operating.

The brass selector disc is fastened to the rear shaft of the tuning condenser by means of two set-screws. When the condenser is at maximum (plates fully meshed) the insulation line should be horizontal, with the operating-end at the left (viewed from rear). The brass is beveled at the operating-end.

The selector disc should be set so that the contact-tip plungers in the station-setting contacts project not more than 1/16-in. from the body of the contacts.

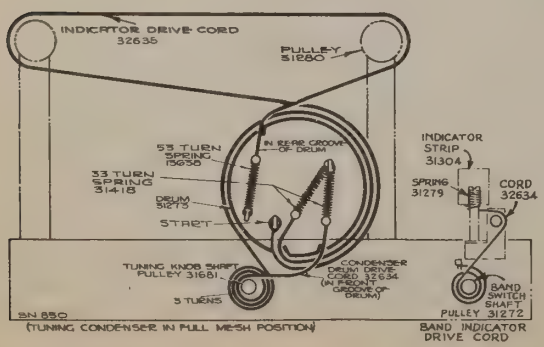
Lubrication

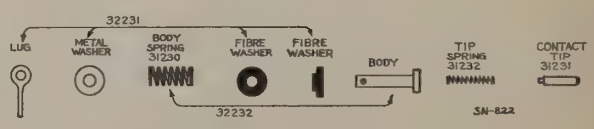
Motor bearings and gear bearings; use light machine oil.

Gear faces; use "Pure Oil No. 611' or petroleum jelly.

Dial-indicator pulleys and rails; use "Castordag" or petroleum jelly.

Selector disc; apply ***thin*** film of petroleum jelly.





Component Parts of Station Setting Contact

At Left—Dial Indicator Drive Cord Assembly

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
35018	Board—"Antenna-Ground" board
32232	Body—Comprising one plunger body and one body spring
31276	Bracket—Band indicator mounting bracket complete except less band indicator, cord and tension spring
31282	Bracket—"Magic Eye" mounting bracket
32090	Bracket—Motor mounting bracket
30766	Cap—Rubber cap for "Magic Eye"
12884	Capacitor—Air trimmer—long (C9)
32088	Capacitor—Dial motor capacitor for 50-60 cycle models
32830	Capacitor—Trimmer comprising 2 sections of 2-20 mmfd. each (C15, C16)
35019	Capacitor—Trimmer comprising 3 sections of 3-30 mmfd. each (C1, C2, C3)
34702	Capacitor—Trimmer comprising 2 sections of 8-80 mmfd. each (C5, C7)
14079	Capacitor—6.8 mmfd. (C4, C20)
12948	Capacitor—33 mmfd. (C10)
12723	Capacitor—56 mmfd. (C22, C46)
12813	Capacitor—82 mmfd. (C21)
12720	Capacitor—100 mmfd. (C36)
34699	Capacitor—100 mmfd. (C23, C24)
34700	Capacitor—120 mmfd. (C25, C26)
12725	Capacitor—150 mmfd. (C28)
13003	Capacitor—180 mmfd. (C27)
12694	Capacitor—220 mmfd. (C13, C19)
31552	Capacitor—680 mmfd. (C8)
34787	Capacitor—2,850 mmfd. (C6)
31399	Capacitor—4,700 mmfd. (C11)
34459	Capacitor—.0025 mfd. (C31, C49)
33584	Capacitor—.005 mfd. (C35, C37)
5148	Capacitor—.007 mfd. (C38, C39, C47, C48)
4937	Capacitor—.01 mfd. (C30, C45)
11315	Capacitor—.015 mfd. (C50)
5196	Capacitor—.035 mfd. (C33)
32787	Capacitor—.05 mfd. (C29, C51)
30965	Capacitor—0.25 mfd. (C32)
12741	Capacitor—0.5 mfd. (C34)
32435	Capacitor—180 mfd. 24 volts for electric tuning motor 110 volt 25 cycle models
35017	Capacitor—Electrolytic comprising 1 section of 30 mfd. and 1 section of 20 mfd. (C30, C40)
35016	Capacitor—Electrolytic comprising 1 section of 40 mfd. and 1 section of 100 mfd. (C42, C43)
34579	Coil—Oscillator coil
34697	Coil—Det. Coil
35015	Condenser—Variable tuning condenser
31231	Contact—Contact tip for station setting contact
31971	Contact—Push button switch contact (11 contacts riveted on insulating strip)
31972	Contact—Push button switch contact (14 contacts riveted on insulating strip)
35022	Control—H.F. tone control
35026	Control—L.F. tone control
35023	Control—Volume control and power switch
32634	Cord—Band indicator cord
32635	Cord—Station selector indicator drive cord
32713	Core—Adjusting core and stud for oscillator coil
32096	Disc—Friction disc and pinion gear
32091	Drive—Friction drive gear assembly
31273	Drum—Variable tuning condenser drive drum
32093	Flywheel—Flywheel for rear end of motor shaft
31239	Gear—Knob shaft drive gear and hub
31304	Indicator—Band indicator strip
31480	Lamp—Station setting indicator lamp
11891	Lamp—Dial lamp—Mazda No. 44
32095	Motor—Dial drive motor, capacitor, friction roller, and damper for 50-60 cycle models
32434	Motor—Electric tuning drive motor, 110 volt, 25 cycle
18469	Plate—Bakelite mounting plate for electrolytic capacitor ..... net
31228	Plate—Contact plate for station setting contacts less contacts
31969	Plate—Lock plate for push button switch comprising 10 contact locks in one strip
31227	Plate—Selector mounting plate—mounts on rear of variable tuning condenser
12493	Plug—5 contact female plug for speaker cable
31280	Pulley—Indicator pointer drive cord pulley
31272	Pulley—Range switch knob shaft pulley for band indicator cord
31271	Pulley—Tuning knob shaft drive cord pulley
35025	Receptacle—Receptacle for power input cable
14439	Resistor—100 ohms, ½ watt (R1, R5)
14720	Resistor—1,000 ohms, ½ watt (R22, R21)
12265	Resistor—6,800 ohms, ½ watt (R10)
14075	Resistor—8,200 ohms, ½ watt (R12)
13045	Resistor—18,000 ohms, ½ watt (R6)
12738	Resistor—27,000 ohms, ½ watt (R29)
12454	Resistor—33,000 ohms, ½ watt (R4)
12266	Resistor—39,000 ohms, ½ watt (R17)
14023	Resistor—82,000 ohms, ½ watt (R11)
13698	Resistor—180,000 ohms, ½ watt (R7)
12264	Resistor—220,000 ohms, ½ watt (R19, R15, R18, R20)
14983	Resistor—330,000 ohms, ½ watt (R9)
12486	Resistor—560,000 ohms, ½ watt (R27, R14)
12013	Resistor—1 megohm, 1/10 watt (R23)
13730	Resistor—1 megohm, ½ watt (R3)
12679	Resistor—2.2 megohm, ½ watt (R2, R8, R16)
35020	Resistor—Voltage divider tapped at 3,000 ohms, 2,500 ohms, 7 ohms and 133 ohms
14887	Retainer—Drive cord pulley retainer
35024	Rod—Trimmer capacitor adjusting rod
32086	Roller—Rubber friction roller for front end of motor shaft
31233	Rotor—Selector rotor disc—mounts on rear of variable tuning condenser shaft
5042	Screw—No. 8-32-1/8-inch set screw for pulley Stock No. 31271
4669	Screw—No. 8-32-3/8-inch square head set screw for drum Stock No. 31273
31681	Shaft—Dial drive knob shaft
34575	Socket—3-contact female, loop socket
31364	Socket—Insulated dial lamp socket
31365	Socket—Non-insulated dial lamp socket
13871	Socket—"Magic Eye" socket
33514	Socket—"Phonograph-Television" socket
31251	Socket—Tube socket
31232	Spring—Contact tip spring for station setting contact
13638	Spring—Indicator drive cord spring
31970	Spring—Push button lock bar spring
31230	Spring—Station setting contact body spring
31418	Spring—Variable condenser drive cord spring
35021	Switch—Range switch
31968	Switch—Station selector push button switch complete
34698	Transformer—First i-f transformer
34524	Transformer—Second i-f transformer
32231	Washer—comprising 1 metal washer, 2 fibre washers and 1 solder lug for station selector plunger
32094	Washer—Spring washer for mounting damper
	POWER SUPPLY UNIT ASSEMBLIES
11765	Lamp—Pilot lamp, —Model U46
35052	Plug—Power input cable plug
30868	Plug—2 contact female plug for motor lead and for compartment lamp—Model U46
31364	Socket—Pilot lamp socket—Model U46
31251	Socket—Tube socket
35249	Transformer—Power transformer—110 volt, 25 cycle
35250	Transformer—Power transformer—Univ. 60 cycle
35027	Transformer—Power transformer—110 volt, 60 cycle
	PICKUP AND ARM ASSEMBLIES Model U46
34011	Arm—Pickup arm shell
33905	Crystal—Pickup cartridge
34013	Pin—Used to fasten pivot arm in pickup arm shell
33529	Screw—Needle screw
34012	Shaft—Pickup pivot shaft and pivot arm
	MOTOR BOARD MECHANISM Model U46
33998	Base—Tone arm mounting base
33996	Board—Motor board complete with all riveted and welded posts and brackets—less operating mechanisms
32556	Cable—Shielded pickup cable (8)
33999	Cup—Needle cup (6)
33997	Escutcheon—Index escutcheon
31151	Guide—Lift cable guide
31150	Mounting—Pickup arm base rubber mounting complete
34875	Switch—Pickup shorting switch (44)
	OPERATING MECHANISM Model U46
33580	Arm—Drive arm and bushing for flexible coupling (motor end)
34009	Arm—Drive arm and gear for flexible coupling (T.T. end) (24)
33984	Bracket—Pickup locating lever mounting bracket (3)
33987	Cam—Cam and gear complete (42)
6808	Clutch—Friction clutch complete (5)
31116	Finger—Friction finger complete (7)
33581	Frame—Flexible coupling metal frame
32879	Gear—Rack gear for front left hand record post (41)
32880	Gear—Rack gear for rear right hand record post (40)
31121	Gear—Record post gear (10)
33982	Guide—Main lever spring guide (11)
34999	Lever—Locating lever and pawl assembly (14)
31137	Lever—Index lever pawl (13)
34000	Lever—Index lever complete (12)
33985	Lever—Main lever complete (15)
34007	Lever—Mercury switch actuating lever (29)

Replacement Parts (Continued)

STOCK No.	DESCRIPTION
31140	Lever—Pickup lift cable lever and spring assembly (16)
31130	Lever—Record separator elevating lever complete with adjusting screws (18)
34002	Lever—10-inch and 12-inch record discriminating lever (17)
31132	Lever—Trip detaining lever (19)
34014	Lever—Trip lever and cam complete (20)
31131	Lever—Trip regulator lever (21)
34086	Link—Index lever link
34004	Link—Mercury switch disengaging lever
31133	Pawl—Trip pawl assembly (22)
31124	Pin—Record post drive pin (23)
31535	Pin—Turntable spindle pin
30870	Plug—2 contact male plug for switch leads
34008	Roller—Mercury switch lead roller
31147	Rubber—1 set of rubber strips for flexible coupling
31118	Screw—No. 10-32 cone-pointed set screw
32869	Screw—No. 10-32 set screw
34001	Screw—Record separator elevator lever ball point adjusting screw
33983	Screw—Record separator shelf elevating lever screw
14195	Screw—Set screw for flexible coupling
31117	Screw—Trip lever and cam adjusting screw
33990	Separator—Record separator knife (25)
33988	Shaft—Record post gear shaft (34)
33989	Shelf—Record post shelf assembly (27)
31141	Spindle—Turntable spindle
3676	Spring—Cam pawl tension spring
31136	Spring—Index lever pawl spring (30)
32436	Spring—Locating lever and pawl spring (35)
32882	Spring—Main lever tension spring (43)
32868	Spring—Mercury switch cam spring (49)
34005	Spring—Mercury switch disengaging lever spring (50)
3666	Spring—Pickup lift cable lever spring (31)
14190	Spring—Pickup locating lever pawl spring (28)
33994	Spring—Pickup locating lever spring (9)
14191	Spring—Trip detaining lever spring (33)
32867	Spring—Trip lever cam tension spring
34006	Support—Mercury switch support bracket and terminal board
32866	Switch—Mercury switch (4)
34003	Turntable—Record turntable
31143	Washer—Turntable shim washers
	MOTOR ASSEMBLIES Model U46
31617	Bracket—Governor and bearing bracket
31626	Coil—Field coil and laminations for 110 volts, 25 cycles motor
31619	Coil—Field coil and laminations for 110 volts, 50/60 cycles motor
31624	Governor—Complete for 110 volts, 25 cycles motor
11703	Governor—Complete for 110 volts, 50/60 cycles motor
31448	Motor—Motor 110 volts, 25 cycles
31163	Motor—Motor 110 volts, 50-60 cycles net
30870	Plug—2 prong male plug for motor leads
31616	Screw—Rotor thrust bearing screw and nut
31620	Screw—Speed regulator screw and nut
30868	Socket—2 contact female socket for motor leads
31636	Spindle—Motor spindle and gear for 110 volts, 25 cycles motor
31634	Spindle—Motor spindle and gear for 110 volts, 60 cycles and 110 volts, 50-60 cycles motors.

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES (RL-76B-5)
13867	Cap—Dust cap
14922	Coil—Field coil (1,300 ohms)
14604	Coil—Neutralizing coil
14602	Cone—Cone complete with voice coil
34728	Diffuser—Speaker diffuser
31539	Plug—5-prong male speaker plug
12568	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
35046	Bearing—Antenna loop bearing comprising pivot and spindle
X-816	Board—Baffle board and grille cloth—Model K130
35033	Button—Push button
13103	Cap— lamp cap—Model U46
X-815	Cloth—Grille cloth—Model U46 net
31456	Cover—Marker protective cover
31359	Cushion—Push button rubber cushion
35035	Dial—Glass dial scale
35045	Dowel—One foot of dowel material
35034	Escutcheon—Dial scale escutcheon—less dial scale and push buttons
34583	Frame—Frame only for "C" band antenna loop —less wire and plug
32083	Frame—Dial frame complete—less dial, pointer and carriage, pointer carriage guide rods
35038	Gasket—Rubber gasket for motorboard—Model U46
35043	Hinge—Bottom door hinge—L.H.—Model U46
35044	Hinge—Bottom door hinge—R.H.—Model U46
34870	Hinge—R.H. top door hinge for U46
34871	Hinge—L.H. top door hinge for U46
4585	Hinge—Top door hinges—R.H. and L.H. (Model K-130)
31305	Indicator—Station selector indicator and carriage
35041	Knob—Magic Antenna or tone control knob
35031	Knob—Range switch, tuning or volume control and power switch knob
4206	Lamp—Compartment lamp —Model U46.
35030	Loop—"A" and "B" band antenna loop
35036	Marker—"Dial Tuning" marker
33973	Marker—Push button call letter markers
31470	Mounting—Motorboard suspension springs, lockwashers and screws—Model U46
35029	Mounting—One set speaker mounting hardware consisting of rubber grommets and eyelets
30870	Plug—2-prong male plug for motor leads—Model U46
34990	Plug—2-prong male plug for "C" band antenna loop
32641	Plug—3-prong male plug for "A" and "B" band loop
35042	Pull—Door pull—Model U46
35050	Pull—Door pull—Model K130
31514	Receptacle—Needle receptacle—Model U46
4669	Screw—No 8-32 square head set screw for holding flexible shaft to antenna loop
35184	Shade—Compartment lamp shade—Model U46.
35037	Shaft—Flexible shaft to turn loop (7¼-inches) Model U46
35049	Shaft—Flexible shaft to turn loop (13¼-inches) Model K130
34491	Shaft—Pointer carriage guide rods
35032	Shaft—Push button pivot shaft
35040	Socket—Compartment lamp socket—Model U46
14270	Spring—Retaining spring for knobs Stock 35031
35039	Switch—Compartment lamp switch—Model U46

RCA Victor

MODEL U-50

CHASSIS No. RC-414C

Five-Tube, Three-Band, A-C, Superheterodyne Victrola

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 15—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast (A)	540-1,720 kc (555-174 m)
Medium Wave (B)	2.3-7.0 mc (130-42.8 m)
Short Wave (C)	7.0-22 mc (42.8-13.6 m)
INTERMEDIATE FREQUENCY	455 kc

TUBE COMPLEMENT

(1) RCA-6SA7	First Detector-Oscillator
(2) RCA-6K7	I-F Amplifier
(3) RCA-6SQ7	Second Det., A.V.C., and A-F Amplifier
(4) RCA-6F6-G	Power Output
(5) RCA-5Y3-G	Rectifier

PILOT LAMP (1) .....
Mazda No. 44, 6.3 volts, 0.25 amp.

POWER OUTPUT RATING

Undistorted	2.0 watts
Maximum	3.6 watts

POWER SUPPLY RATINGS
Rating A.. 105-125 volts, 50-60 cycles, 105 watts

LOUDSPEAKER (84604-1)

Type	8-inch electrodynamic
Voice Coil Impedance	3.3 ohms at 400 cycles

	Height	Width	Depth
Cabinet Dimensions	9¾ in.	18-15/16 in.	14⅛ in.
Chassis Base Dimensions	2¾ in.	12 in.	5¼ in.

Chassis Height	7⅛ in.
Weight (shipping)	38⅛ lbs.
Tuning Drive Ratio	11 to 1

General Description

Victrola Model U-50 is a portable radio-phonograph instrument designed for a.c. operation. It consists of a five-tube, three-band receiver and manual phonograph equipment, housed in a luggage type case. Features of design include: Crystal pickup; constant-speed induction motor; mercury switch for automatic starting and stopping; automatic volume control; automatic bass compensation; continuous tone control; new type, single-ended tubes (6SA7 and 6SQ7); magnetite-core I-F transformers; magnetite-core oscillator coil for "A" band; straight-line, edge-lighted dial; power-line antenna.

Miscellaneous Service Data

Phonograph Mechanism:

The phonograph motor is a self-starting, constant-speed induction type. It should be lubricated every six months by applying a few drops of light machine oil to the spindle bearing and oil hole.

The motor spindle is tapered, and a conical rubber piece fits snugly on the spindle. The hole in the turntable bushing is tapered to fit the rubber. This provides an excellent self-centering floating mounting.

A metal washer is placed on the spindle under the rubber piece. The washer has ears on the under side which fit over a pin that projects through the spindle.

The motor switch is automatic for both starting and stopping, and when properly adjusted, will turn the motor on as the pickup is moved from the pickup rest toward the turntable. The switch should be adjusted so that it will snap into the "off" position when the pickup needle is 1¾ inches from the center line of the spindle shaft. The motor may be shut off at any time by placing the pickup on the pickup rest.

Power-Line Antenna:

At the back of the motorboard is a terminal board for antenna and ground connections. When it is desired to use the power line antenna, a jumper should be placed across the two outside binding-posts, thus connecting the antenna input of the receiver through a capacitor to the power line. The center binding-post is for the ground connection. When an external antenna is used, it should be connected to the post marked "ANT".

Precautionary Lead Dress:

1. Lead from 2nd I-F transformer to volume control should be kept close to the chassis and dressed against front apron.
2. C-10 should be dressed away from the antenna section of the variable condenser (C-1).

First Edition

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Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale On Indicator-Drive-Cord Drum.—In most cases it will not be necessary to remove the chassis from the dial scale for alignment, allowing the dial scale to be used for calibration. However, if alignment is made with the receiver chassis removed, the calibration scale attached to the rear of the drum which is mounted on the front shaft of the gang condenser must be used. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 135° mark on the drum scale must be vertical, and directly under the center of the gang-condenser shaft when the plates are fully meshed. The drum is held in place by one set-screw, which must be securely tightened when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

For additional details, refer to booklet "RCA Victor Receiver Alignment."

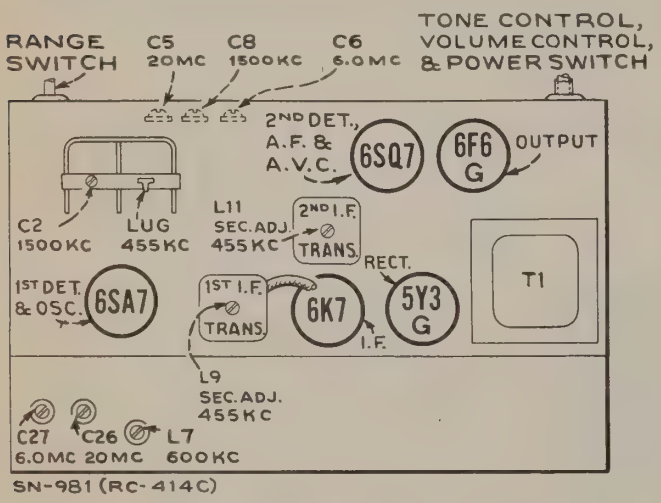
Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	"A" Band quiet point between 550-750 kc	L10 and L11 (2nd I.F. trans.)
2	Tuning condenser stator (osc.) in series with .01 mfd. **	455 kc		L8 and L9 (1st I.F. trans.)
3	Antenna lead in series with 200 mmfd.	600 kc	600 kc (33°) "A" Band	L7†
4		1,500 kc	1,500 kc (152.4°) "A" Band	C2 (ant.) C8 (osc.)
5	Repeat steps 3 and 4			
6	Antenna lead in series with 400 ohms	20 mc	20 mc (155.4°) "C" Band	C5 (osc.) * C26 (ant.)
7		6 mc	6 mc (149°) "B" Band	C6 (osc.) * C27 (ant.)
8	Antenna lead in series with 200 mmf.	1,500 kc	1,500 kc (152.4°) "A" Band	C8 (osc.)

* Use minimum capacity peak if two peaks can be obtained.

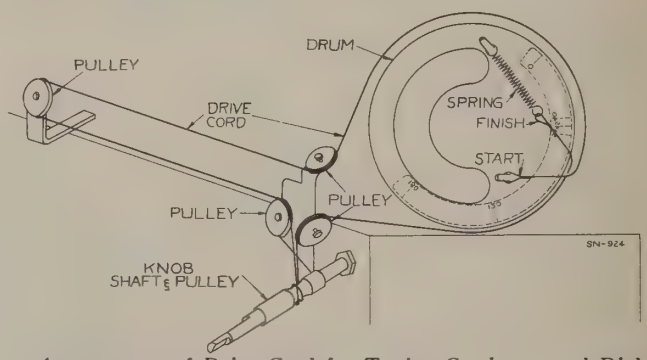
† Rock gang condenser slightly while adjusting L7.

** Make test-oscillator connection to lug on tuning condenser stator (oscillator section) in series with .01 mfd. condenser.

Note.—Oscillator tracks 455 kc above signal on all bands.

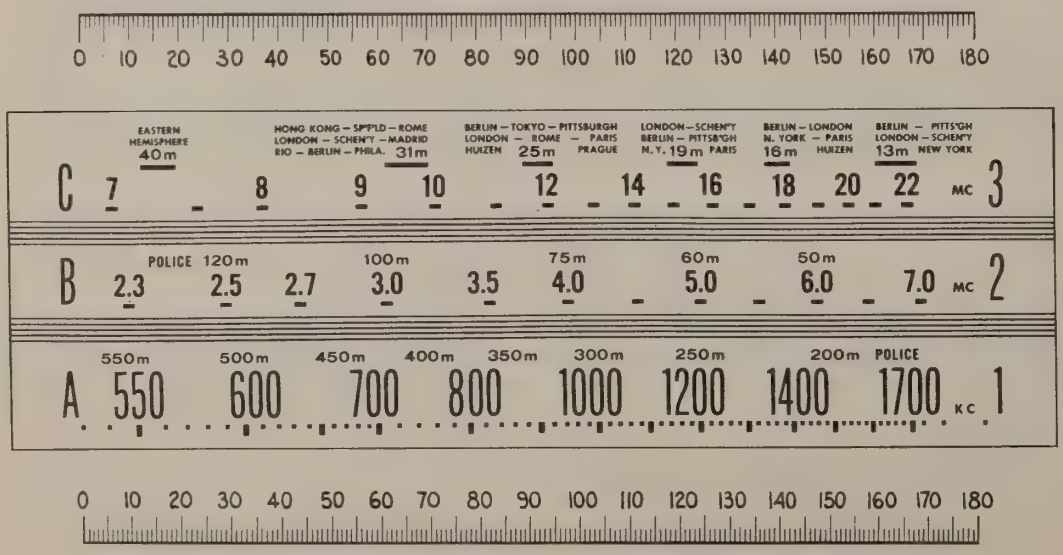


Tube and Trimmer Locations



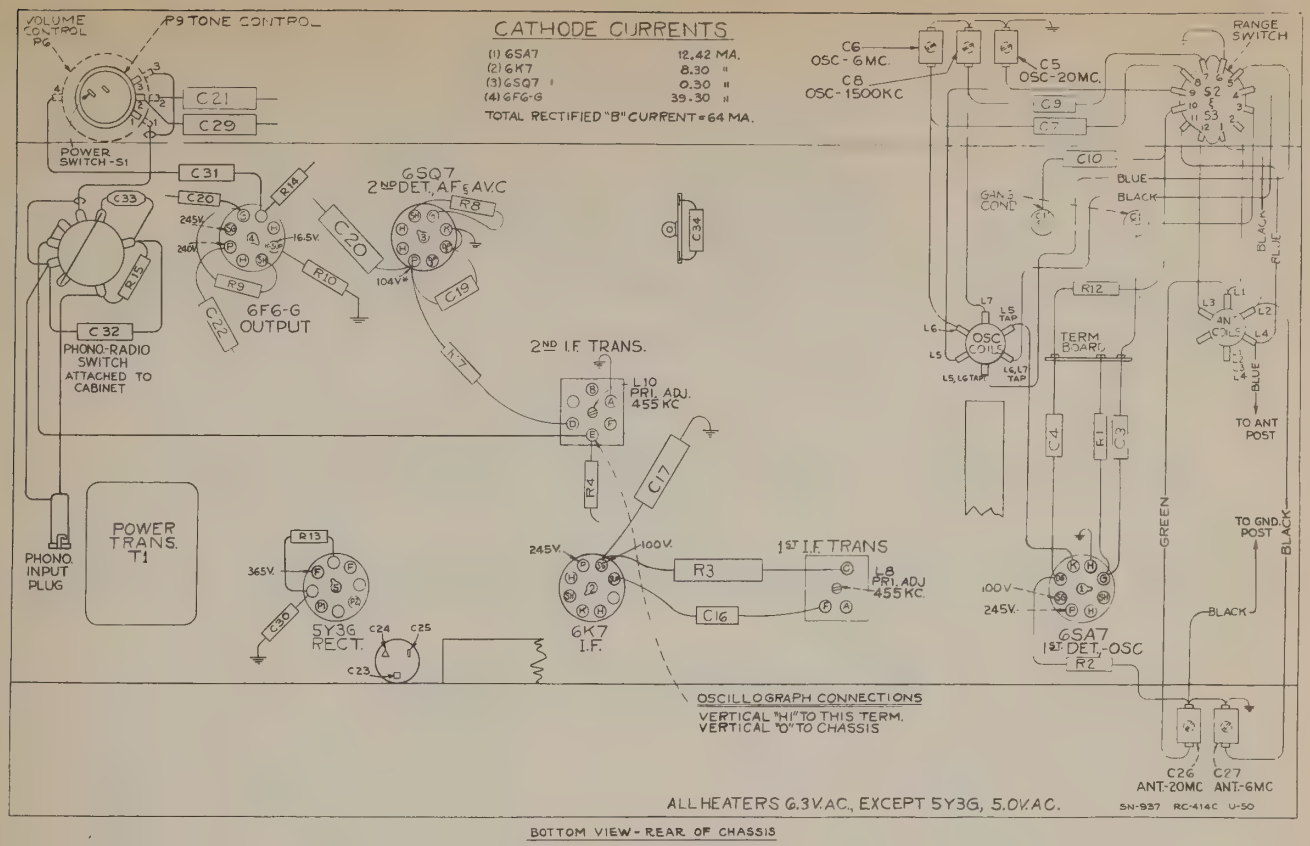
Arrangement of Drive Cord for Tuning Condenser and Dial Indicator. Drum Shown with Gang at Maximum Capacity

Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
EASTERN HEMISPHERE 40m
HONG KONG – SP'FLD – ROME
LONDON – SCHEN'T – MADRID
RIO – BERLIN – PHILA. 31m
BERLIN – TOKYO – PITTSBURGH
LONDON – ROME – PARIS
HUIZEN 25m PRAGUE
LONDON – SCHEN'T
BERLIN – PITTSB'GH
N.Y. 19m PARIS
BERLIN – LONDON
N. YORK – PARIS
16m HUIZEN
BERLIN – PITTS'GH
LONDON – SCHEN'T
13m NEW YORK
C 7 8 9 10 12 14 16 18 20 22 MC 3
POLICE 120m
100m
75m
60m
50m
B 2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 7.0 MC 2
550m 500m 450m 400m 350m 300m 250m 200m POLICE
A 550 600 700 800 1000 1200 1400 1700 KC 1
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 33° on the calibration scale corresponds to approximately 7.9 mc on "C" band, and 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."

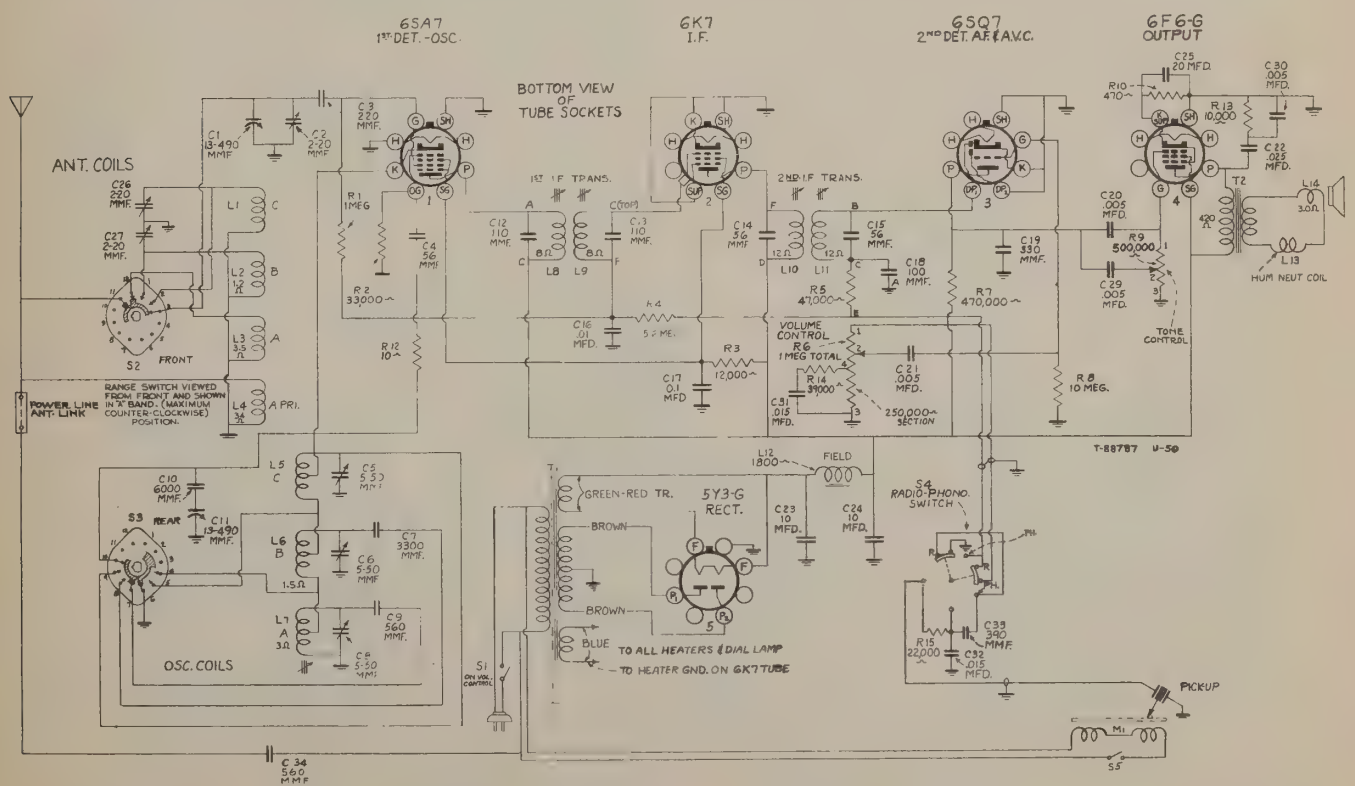


BOTTOM VIEW - REAR OF CHASSIS

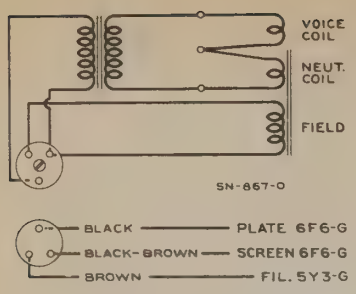
R-F Wiring Diagram and Socket Voltages

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ± 20% with 117-volt a-c supply.

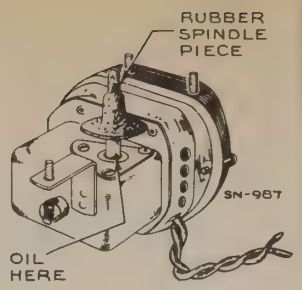
***NOTE:** Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.



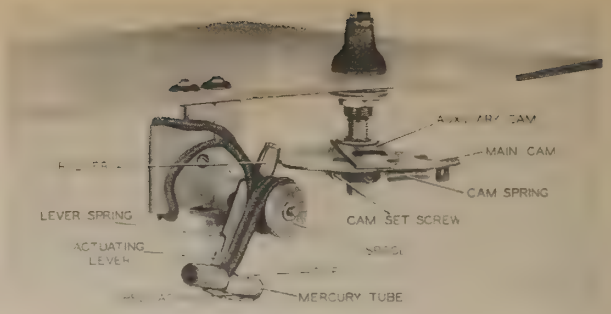
Schematic Circuit Diagram



Connections and Colors of Speaker and Cable



Phonograph Motor



Switch Mechanism
(Shown with pickup in rest position)

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC—414—C)
32834	Bracket—Drive bracket and 1 pulley assembled
33411	Bracket—Drive bracket and 3 pulleys assembled
12581	Cap—Top shield cap for i-f transformer
32830	Capacitor—2-gang trimmer, 2-20 mmfd. each section (C26, C27)
32829	Capacitor—3-gang trimmer, 5-60 mmfd. each section (C5, C6, C8)
12723	Capacitor—56 mmfd. (C4)
30949	Capacitor—56 mmfd. (C14, C15)
14262	Capacitor—109 mmfd. (C12, C13)
32238	Capacitor—110 mmfd. (C18)
30232	Capacitor—220 mmfd. (C3)
12952	Capacitor—330 mmfd. (C19)
13894	Capacitor—390 mmfd. (C33)
12537	Capacitor—560 mmfd. (C9, C34)
31403	Capacitor—3300 mmfd. (C7)
31405	Capacitor—6000 mmfd. (C10)
33584	Capacitor—.005 mfd. (C30)
4838	Capacitor—.005 mfd. (C20, C21, C29)
14393	Capacitor—.01 mfd. (C16)
11315	Capacitor—.015 mfd. (C31, C32)
4870	Capacitor—.025 mfd. (C22)
4839	Capacitor—0.1 mfd. (C17)
32240	Capacitor—Electrolytic, 2 sections 10 mfd., 400 V., and one section 20 mfd., 25 V. (C23, C24, C25)
32821	Coil—Antenna coil (L1, L2, L3, L4)
32824	Coil—Oscillator coil (L5, L6, L7)
32817	Condenser—2-gang variable tuning (C1, C2, C11)
33409	Control—Volume control, tone control, and power switch (R6, R9, S1)
32713	Core—Adjustable core and stud for oscillator coil
32835	Drum—Drive cord drum with set screw
11891	Lamp—Dial lamp—Mazda No. 44
30868	Plug—2-contact female motor cable plug
5119	Plug—3-contact female speaker cable plug
13988	Resistor—10 ohms, ½ watt (R12)
30681	Resistor—470 ohms, 1 watt (R10)
3078	Resistor—10,000 ohms, ½ watt (R13)
31389	Resistor—12,000 ohms, 3½ watts (R3)
13998	Resistor—22,000 ohms, ½ watt (R15)
12454	Resistor—33,000 ohms, ½ watt (R2)
12266	Resistor—39,000 ohms, ½ watt (R14)
5132	Resistor—47,000 ohms, 1/10 watt (R5)
12285	Resistor—470,000 ohms, ½ watt (R7)
13730	Resistor—1 meg., ½ watt (R1)
11668	Resistor—5.6 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R8)
14343	Retainer—Retaining ring to hold tuning knob shaft
32848	Screw—No. 8-32 square head set screw for drum
33412	Shaft—Tuning knob shaft
31365	Socket—Dial lamp socket (insulated)
31251	Socket—Octal base tube socket
31418	Spring—Drive cord tension spring
33413	Switch—Radio-Record switch (S4)
33410	Switch—Range switch (S2, S3)
14376	Transformer—First i-f transformer (L8, L9, C12, C13)
32825	Transformer—Second i-f transformer (L10, L11, C14, C15, C18, R5)
33112	Transformer—Power transformer 105-125 volts, 50-60 cycle (T1)
	PICKUP AND ARM ASSEMBLIES
33216	Arm—Pickup arm—less crystal, needle screw, and cable
33218	Base—Pickup arm mounting base and pivot shaft
33217	Crystal—Pickup crystal cartridge and needle screw
33114	Damper—Viscoloid damper for pickup armature
31160	Screw—Pickup needle screw
	MOTOR ASSEMBLIES
32650	Field—Motor field coils and laminations, 110 volts, 50 cycle
32336	Field—Motor field coils and laminations, 110 volts, 60 cycle
33220	Motor—105-125 volts, 50 cycles—less mounting plate (M1)
33219	Motor—105-125 volts, 60 cycles—less mounting plate (M1)
33361	Shaft—Turntable spindle shaft and gear—50 cycle
33360	Shaft—Turntable spindle shaft and gear—60 cycle
	AUTOMATIC SWITCH ASSEMBLIES
33221	Cam—Cam assembly comprising main and auxiliary cams, hub, and set screws
32864	Lever—Actuating lever with roller and mercury tube clip
14195	Screw—No. 10-32 x 5/16 cone pointed set screw for cam hub
32869	Screw—No. 10-32 x 5/16 set screw for cam hub
32868	Spring—Actuating lever tension spring
32867	Spring—Cam tension spring
32865	Support—Switch support and terminal board
32866	Switch—Mercury tube with leads (S5)
31608	Washer—"C" washer for actuating lever shaft
	SPEAKER ASSEMBLIES (84604-1)
33406	Cone—Speaker cone and voice coil (L14)
5118	Plug—3-contact male for speaker
33222	Speaker complete
33407	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
10290	Cap—Ventilating cap
31464	Damper—Damper plate and rubber sleeve for spindle
32837	Dial—Dial scale (glass)
33415	Escutcheon—Dial scale escutcheon
11771	Foot—Cabinet foot
33416	Frame—Dial frame, support, color plate, and mounting brackets—less pointer and carriage, and dial scale
32633	Handle—Carrying handle
13085	Hinge—Cabinet lid hinge
11865	Holder—Needle cord holder
33468	Knob—Radio-Record switch knob
33506	Knob—Range switch knob (small)
33470	Knob—Tone control and switch knob (small dual)
33505	Knob—Tuning knob (large)
33471	Knob—Volume control knob (large dual)
33223	Mounting—Complete set motor mounting screws, washers, and spacers
31054	Mounting—Pickup arm mounting cushion, washers, and nut
30870	Plug—2-contact male for motor leads
31048	Plug—2-contact male plug for phono. cable
32846	Rod—Indicator slide rod
33418	Spring—Indicator tension spring
30330	Spring—Retaining spring for tone control knob
4982	Spring—Retaining spring for tuning knob
14270	Spring—Retaining spring for volume control, range switch, or radio-record switch knob
33364	Support—Cabinet lid support (LH)
33673	Support—Pickup arm support
33414	Turntable

RCA Victor

MODELS U-121, U-123, and U-127E

CHASSIS No. RC-348J — RC-348H (Single-Band) RC-421 (Two-Band) — RC-348L

Six-Tube, Electric-Tuning, A-C, Victrolas

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 7—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

Frequency Range ..... 540-1,720 kc
RC-421 also has a short-wave band of ..... 5.8-18.0 mc

PUSH BUTTON RANGES (RC-348J, 348H, and 348L)
Two stations between approximately 550- 980 kc
One station between approximately 690-1,225 kc
Two stations between approximately 850-1,500 kc

PUSH BUTTON RANGES (RC-421)
One station between approximately 550- 980 kc
One station between approximately 590-1,020 kc
One station between approximately 690-1,225 kc
Two stations between approximately 890-1,500 kc

TUBE COMPLEMENT
(1) RCA-6A8-G (6SA7 in RC-421) ..... First-Detector, Oscillator
(2) RCA-6K7 ..... Intermediate-Frequency Amp.
(3) RCA-6H6 ..... Second-Detector, A.V.C.
(4) RCA-6F5 (6SF5 in RC-421) ..... Audio Voltage Amplifier
(5) RCA-6K6-G (6F6-G in RC-421) ..... Power Output
(6) RCA-5Y3-G ..... Full-Wave Rectifier

POWER OUTPUT (RC-348J, 348H, and 348L)
Undistorted ..... 2 watts, Maximum ..... 4 watts

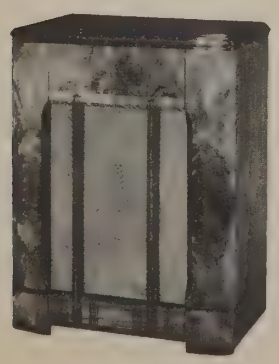
POWER OUTPUT (RC-421)
Undistorted ..... 2.5 watts, Maximum ..... 4.5 watts

POWER SUPPLY RATINGS
A-6 ..... 105-125 volts, 60 cycles, 100 watts total
A-5 ..... 105-125 volts, 50 cycles, 100 watts total
B-2 ..... 105-125 volts, 25 cycles, 100 watts total
C-6 ..... 105-125/210-250 volts, 60 cycles, 100 watts total
C-5 ..... 105-125/210-250 volts, 50 cycles, 100 watts total

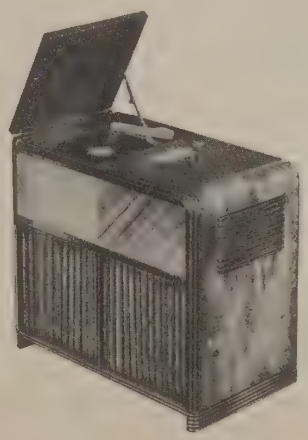
	U-121	U-123 (RC-348H)	U-123 (RC-421)	U-127E
Loudspeaker (electrodynamic)	RL-70F-3	RL-70F-3	RL-70H-6	RL-63H-5
Diameter	12-inch	12-inch	12-inch	8-inch
Voice-Coil Impedance at 400 cycles	2.2 ohms	2.2 ohms	2.2 ohms	2.2 ohms

CABINET DIMENSIONS:	U-121	U-123	U-127E
Height (inches)	34	34	25⅜
Width (inches)	25⅜	30⅜	29
Depth (inches)	16¾	17	16¾
Weight (net) pounds	55	74	52
Weight (shipping) pounds	73	94	71

Chassis Base Dimensions ..... 3 inches x 11⅛ inches x 5 inches
Over-all Chassis Height ..... 6¼ inches
Tuning Drive Ratio ..... 6 to 1



Model U-121 (Manual)



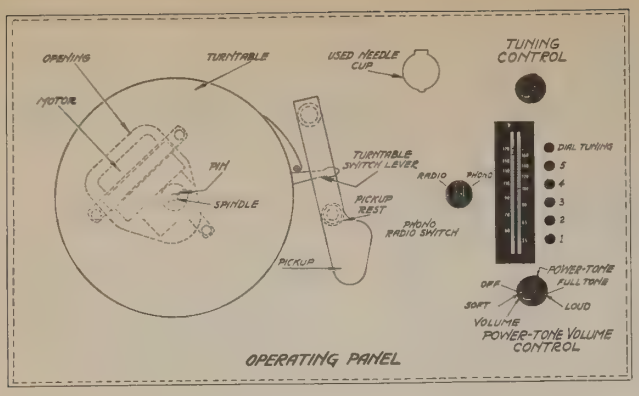
Model U-127E (Manual)

Model U-123 (Automatic)

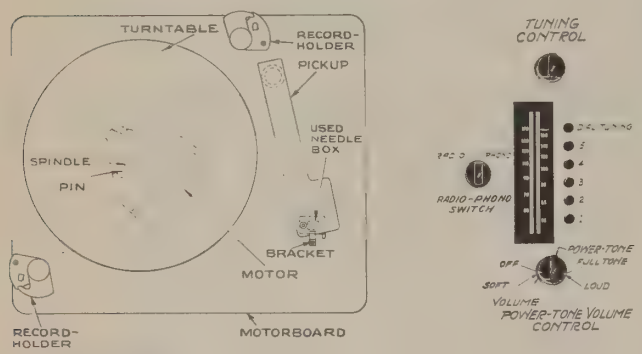
Models U-121 and U-127E have a non-automatic Victrola mechanism, with crystal pickup, automatic stop, and self-starting constant-speed motor.

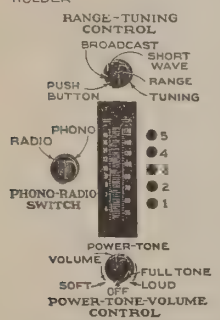
Model U-123 has an automatic Victrola mechanism which permits playing seven 12-inch or eight 10-inch records in succession. It has a crystal pickup and constant-speed self-starting motor.

Radio features include: Magnetite-core electric-tuning oscillator coils and magnetite-core i-f transformers; automatic volume control; automatic bass compensation; continuously-variable high-frequency tone control; temperature-stabilized capacitors in oscillator circuit; electro-dynamic loudspeaker; straight-line dial and electric tuning for five stations in the broadcast range.



Operating Controls, Model U-121

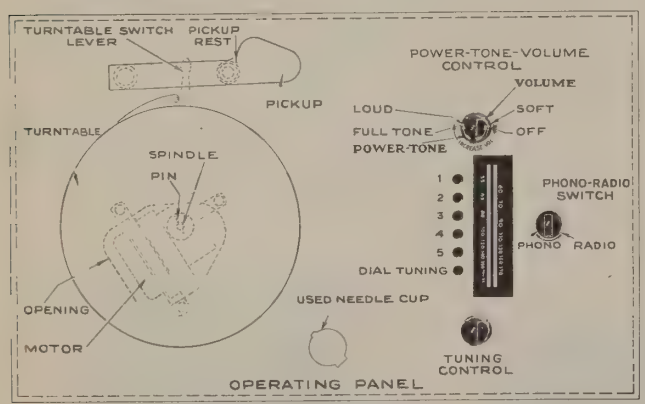




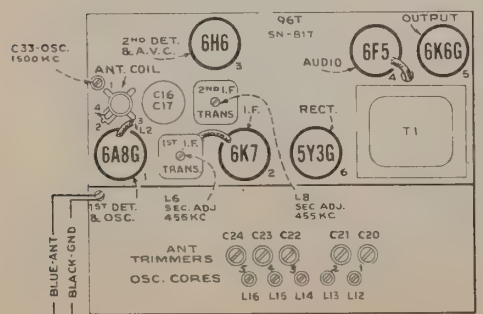
Operating Controls, Model U-123

Above—Radio controls for single-band U-123 (RC-348H).

At left—Radio controls for double-band U-123 (RC-421).

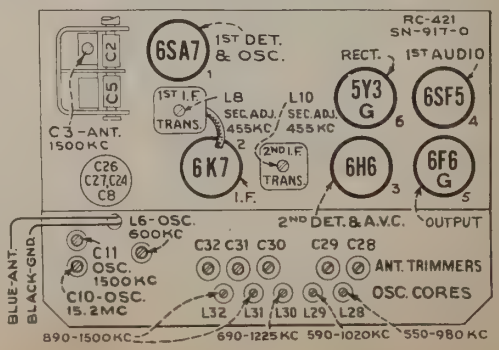


Operating Controls, Model U-127E



At left—Tube and trimmer location for single-band chassis, RC-348J, RC-348H, and RC-348L.

At right—Tube and trimmer location for double-band chassis RC-421.



Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing. Turn the receiver volume control to maximum.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks corresponding to dial readings of 600 kc and 1,500 kc have been stamped in the plate on the front of the chassis, as shown in the accompanying drawing. These marks are used for reference during alignment.

Drum and Dial Indicator Adjustment.—As the first step in r-f alignment, check the position of the drum on the front shaft of the gang condenser. With the gang at maximum (full mesh) the drum set-screw should be pointing directly down (RC-348 series) and up for RC-421. With the drum in this position, and the gang at maximum, move the dial indicator along the drive cord to coincide with the left-hand line as shown. The indicator is held to the drive cord by means of spring clips.

After completion of alignment, and after the chassis has been fastened in the cabinet, turn the gang to maximum and note whether the dial indicator is at the left-hand end mark on the dial; if it is not, move the pointer the required distance along the cord.

For additional details, refer to booklet, "RCA Victor Receiver Alignment."

RC-348J, RC-348H, and RC-348L

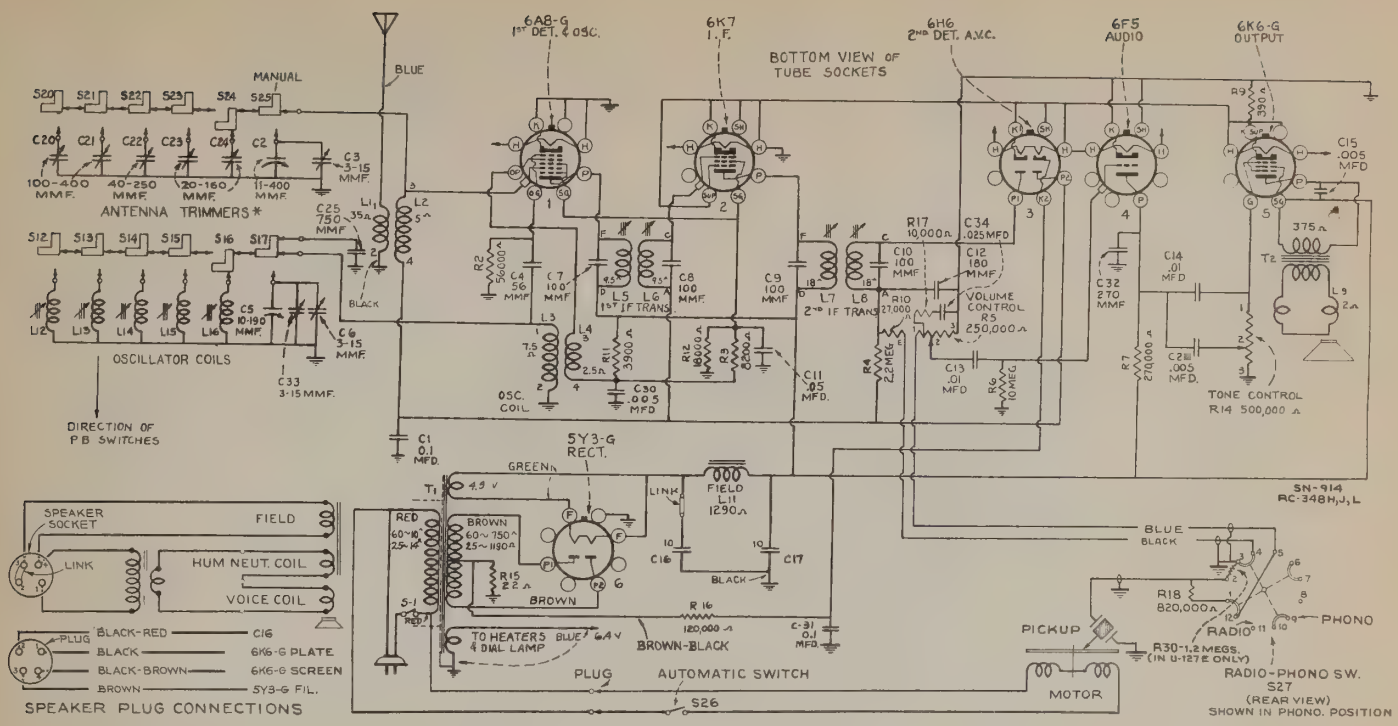
Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	Quiet point between 550-750 kc	L7 and L8 (2nd I-F Trans.)
2	6A8-G grid cap, in series with .01 mfd.	455 kc		L5 and L6 (1st I-F Trans.)
3	Antenna lead (blue) in series with 200 mmf.	1,500 kc	1,500 kc calibration mark	C6 (osc.)* C3 (ant.)
4	Follow "Adjustments for Electric Tuning."			

* The oscillator section of the gang condenser has two trimmers, one on top, accessible through a hole in the chassis, and the other on bottom. It may be necessary to adjust both of these trimmers to secure a peak on 1,500 kc.

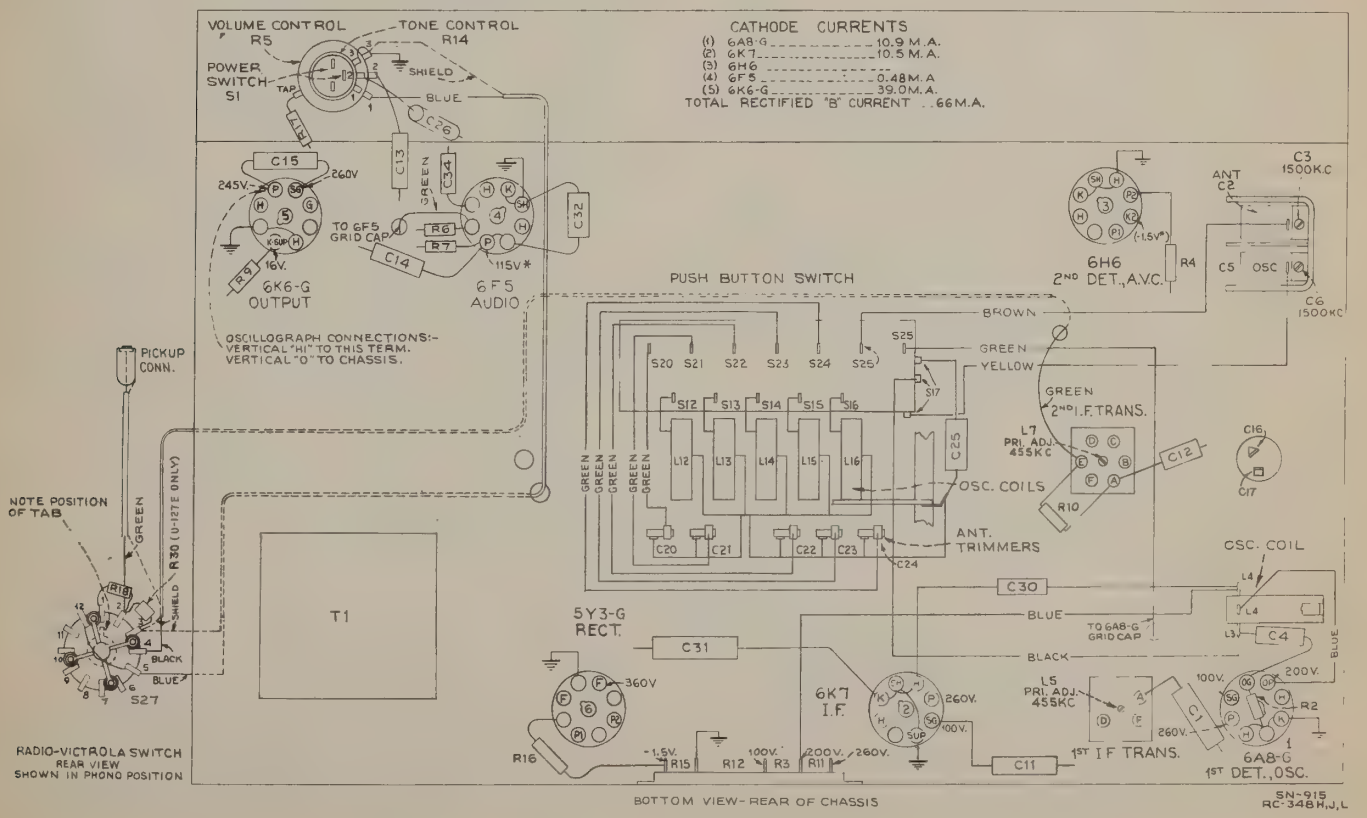
RC-421 (Two-band Model U-123)

Steps	Connect the high side of test.-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	Quiet point between 550-750 kc	L9 and L10 (2nd I-F trans.)
2	Stator of ant. section of gang	455 kc		L7 and L8 (1st I-F trans.)
3	Antenna lead, in series with 200 mmf.	600 kc	600 kc calibration mark	L6 (osc.)
4		1,500 kc	1,500 kc calibration mark	C11 (osc.) C3 (ant.)
5	Repeat steps 3 and 4.			
6	Antenna lead, in series with 400 ohms	15.2 mc	15.2 mc calibration mark	C10 (osc.)*
7	Follow "Adjustments for Electric Tuning."			

* Rock gang for maximum output while adjusting C10.
Note.—The oscillator tracks above the signal on both bands.



Precautionary Lead Dress.—(1) Dress green lead from antenna coil to switch away from the chassis and gang. (2) Ground bus from 6H6 socket must be close to chassis. (3) Dress leads away from oscillator coil adjustment screws. (4) Dress power transformer primary leads toward left-hand end of chassis. (5) Dress plate lead from output tube close to chassis.



Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within approximately ± 20% with 117-volt a-c supply.

***NOTE:** Values with star (*) are operating voltages in circuits with high series-resistance. The actual measured voltages will be lower, depending on the voltmeter loading.

Automatic Record Changer

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc. are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and revolving the turntable by hand. Six turntable revolutions are required for one change cycle.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

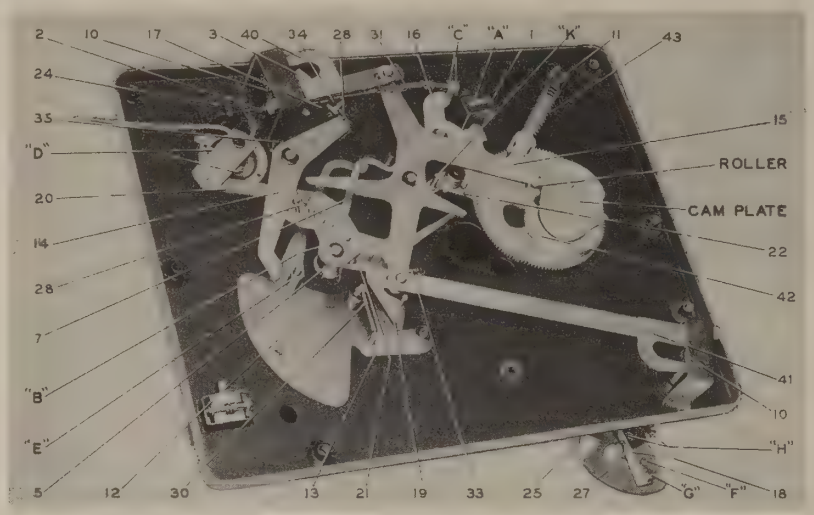
The 10 and 12 inch records must be absolutely flat for smooth operation when using a mixture of the two sizes.

A shorting switch, located in the pickup head, operates due to pressure when the pickup is placed on the pickup rest.

ADJUSTMENTS

A. Main Lever.—This lever is basically important in that it interlinks the various individual mechanisms which control needle landing, tripping, record separation, etc. One adjustment is provided for the main lever. Rotate the turntable until the changer is out-of-cycle; and adjust rubber bumper bracket (A) so that the roller clears the nose of the cam plate by 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the record is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pickup is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the trip finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.



NOTE: Numbers refer to parts—letters refer to adjustments

C. Pickup Lift Cable Screw.—During the record change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pickup lift cable. To adjust pickup for proper elevation, stop the changer "in-cycle" at the point where pickup is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknuts "C" to obtain 1 inch spacing between needle point and turntable top surface.

D. & E. Needle Landing on Record.—The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10 inch record. Position of eccentric stud "E" governs the landing of the needle on a 12 inch record; this, however, is dependent on the proper 10 inch adjustment.

To adjust for needle landing, place 10 inch record on turntable; push index lever to reject position and return to the 10 inch position; see that pickup locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on the record; then see that pin "V" on lever "14" is in contact with "Step T" on lever "17." The correct point of landing is 4-11/16 inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17." Leave approximately 1/32 inch end play between hub of lever "20" and pickup base bearing, and tighten the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone pointed screw "D."

After adjusting for needle landing on a 10 inch record, place 12 inch record on turntable; push index lever to reject and return to 12 inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5-11/16 inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be toward the rear of the motor board, otherwise incorrect landing may occur with 10 inch records.

F. & G. Record Separating Knife.—The upper plate (knife) "25" on each of the record posts serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "27" be accurately maintained. The spacing for the 10 inch record is nominally .058 inch, and for the 12 inch record is .075 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "F" to give .055—.061 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F" adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072—.078 inch.

H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustment be such that the record is released from both shelves at the same instant. To adjust, place a 12 inch record on the turntable, rotate mechanism into cycle to the point where tone arm is at maximum distance outward from turntable; lift record upward until it is in contact with both separating knives, then loosen screws "H" and shift record shelves so that the curved inner edges of the shelves are uniformly spaced at least 1/16 inch from record edge. Tighten the blunt nose screw "H," run mechanism through cycle several times to check action, then tighten cone pointed screw "H."

If record shelves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown).—When the changer is out-of-cycle, the front lower edge of the pickup head should be 5/16 inch above surface of motor board. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication.—Petrolatum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motor board.

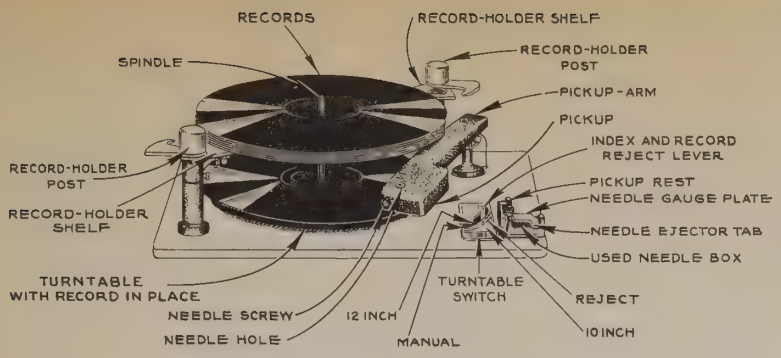
Apply a few drops of light machine oil to the motor spindle bearing and oil hole adjacent to the spindle bearing. The oil hole has a screw plug.

Do not allow oil or grease to come in contact with, rubber mounting of tone arm base, rubber bumper, or rubber spindle cap.

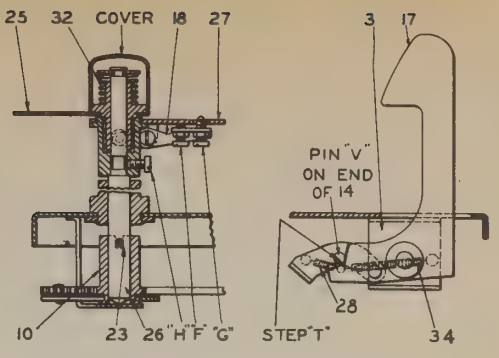
MISCELLANEOUS SERVICE HINTS

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual misadjustments will enable ready adjustment in most cases.

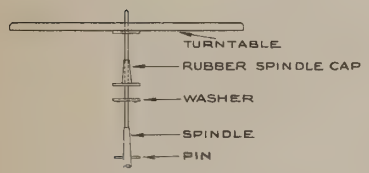
1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A."
2. Needle does not land properly on both 10 and 12 inch records —Make complete adjustments "D" and "E."
3. Needle does not land properly on 12 inch record but correct on 10 inch—Effect adjustment "E."
4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B." Also, see that levers "7" and "12" are free to move without touching each other.
5. Pickup strikes lower record of stack or drags across top record on turntable—Adjust lift cable per adjustment "C."
6. Needle does not track after landing—Friction clutch "5" adjustment "B" may be too tight; bind in tone arm vertical bearing; levers "7" and "12" fouled; or pickup output cable twisted.
7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.
8. Wow in record reproduction—Record is defective; or instrument is not being operated at normal room temperature (65° F).
9. Record knives strike edge of records—Records warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.
10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H."
11. Needle lands in 10 inch position on 12 inch record or misses record when playing both types mixed—Increase tension of pickup locating lever spring "34."



Top View of Automatic Record Changer



Details of Record Shelf Posts, and Locating Lever Assemblies



Turntable Assembly (All Models)

The crystal pickup is sealed in a metal case as protection against extreme changes of climate. If failure occurs, do not attempt to repair the unit, but install a new crystal unit.

The phonograph motor is a self-starting constant-speed induction type.

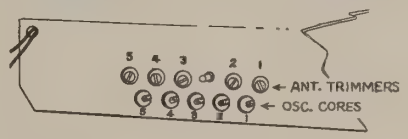
Motor Lubrication (Models U-121 and U-127E).—Apply a few drops of light machine oil to the spindle bearing and oil hole every six months. The oil hole is located in the motor casting, adjacent to the spindle bearing, and has a screw plug.

The automatic stop (Models U-121 and U-127E) should be adjusted so that the lever will snap to the "off" position when the pickup needle is 1¾ inches from the center line of the spindle.

Adjustments for Electric Tuning

Push-Button Ranges in RC-348J, 348H, and 348L (Single-Band Receivers)

No. 1 and 2...Approximately 550- 980 kc
No. 3.....Approximately 690-1,225 kc
No. 4 and 5...Approximately 850-1,500 kc



Push-Button Ranges in RC-421 (Two-Band Model U-123)

No. 1.....Approximately 550- 980 kc
No. 2.....Approximately 590-1,020 kc
No. 3.....Approximately 690-1,225 kc
Nos. 4, 5.....Approximately 890-1,500 kc

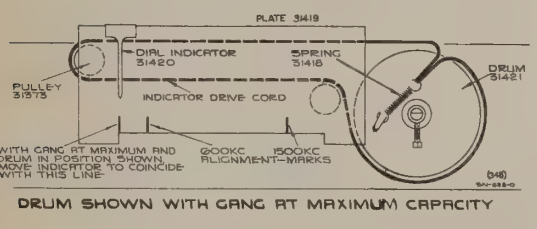
These models have six push buttons. The right-hand button connects the gang condenser for dial tuning. The other five buttons are for electric tuning of five different stations in the standard-broadcast range. The station buttons connect to separate magnetite-core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31031. Allow at least five minutes warm-up period before making adjustments. Use a regular antenna for the preliminary adjustments.

The procedure is as follows:

1. Make a list of the five desired stations, arranged in order from low to high frequencies.
2. Push in the dial-tuning button, and manually tune in the first station on the list.
3. Push in station-button No. 1 and adjust No. 1 oscillator core to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until the station is received.
4. Adjust No. 1 antenna trimmer for maximum output on this station.
5. Adjust for each of the remaining four stations in the same manner.

(Clockwise adjustment of oscillator cores and antenna trimmers tunes the circuits to lower frequencies.)

6. Make a final careful adjustment of the oscillator cores using one or two feet of wire as an antenna.

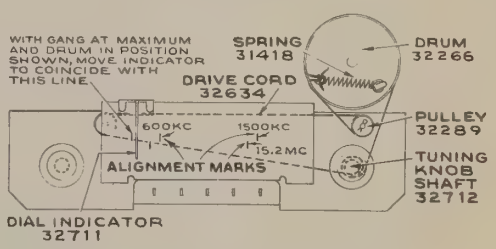


DRUM SHOWN WITH GANG AT MAXIMUM CAPACITY

Dial Mechanism

RC-348J, 348H, and 348L

RC-421



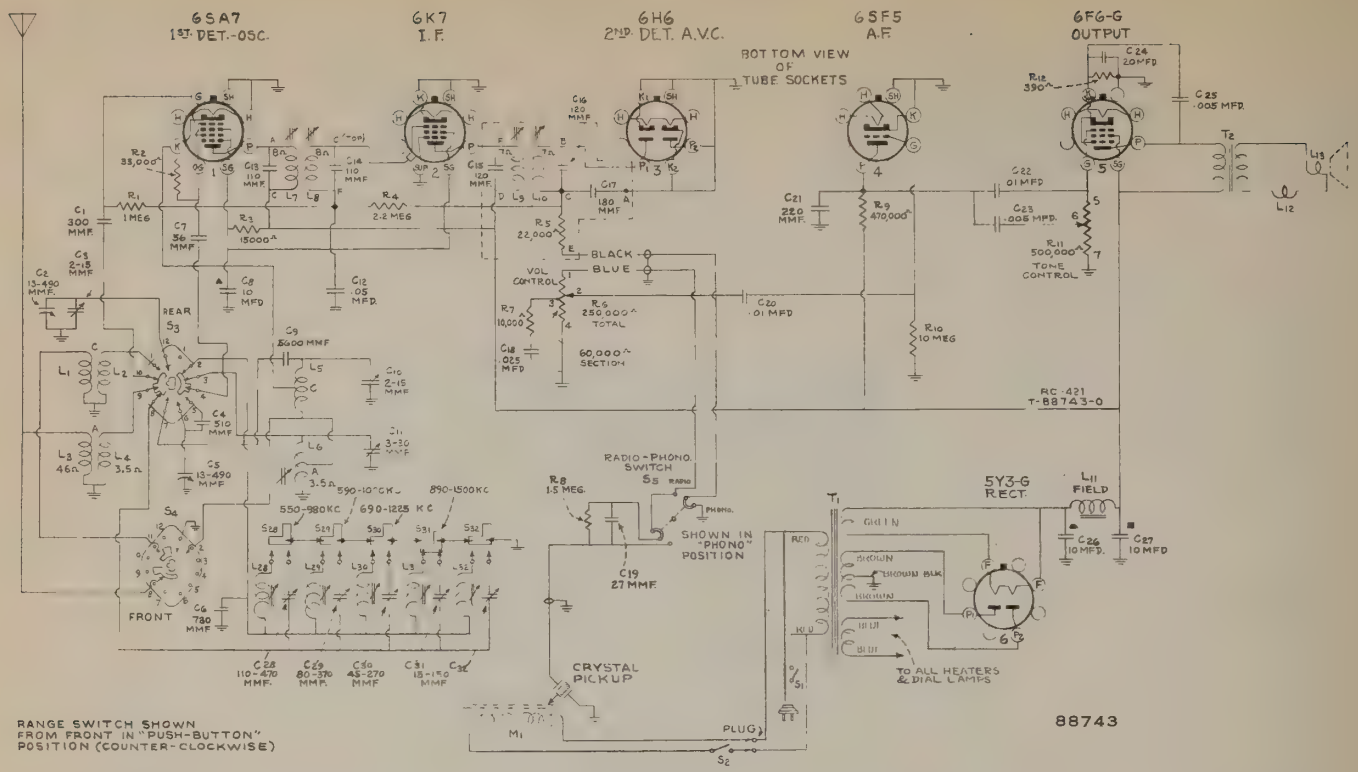
Replacement Parts Models U-121, U-123 (Single-Band), and U-127E

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (U121-RC348J) (U123-RC348H, Single-Band) (U127E-RC348L)		32342	Capacitor—10-10 mfd. electrolytic capacitor (C16, C17)	
			31382	Clip—Coil and core clip for push button oscillator coils	
32339	Capacitor—Capacitor bank for push button switch assembly (C20, C21, C22, C23, C24)		32338	Coil—Antenna coil (L1, L2)	
12723	Capacitor—56 mmfd. (C4)		31098	Coil—Oscillator coil (L3, L4)	
30904	Capacitor—100 mmfd. (C7, C8, C9, C10)		31415	Coil—Push button oscillator coil, 550 to 980 KC. (L12, L13)	
13003	Capacitor—180 mmfd. (C12)		32340	Coil—Push button oscillator coil, 690 to 1,225 KC. (L14)	
12488	Capacitor—270 mmfd. (C32)		31383	Coil—Push button oscillator coil, 850 to 1,500 KC. (L15, L16)	
31435	Capacitor—750 mmfd. (C25)		31422	Condenser—2-gang variable tuning condenser (C2, C3, C5, C6, C33)	
4838	Capacitor—.005 mfd., 1,000 volts (C15, C26, C30)		32355	Control—Volume and tone control and power switch (R5, R14, S1)	
14393	Capacitor—.01 mfd. (C13, C14)		32634	Cord—Drive cord	
4870	Capacitor—.025 mfd., 400 volts (C34)				
30882	Capacitor—.05 mfd., 200 volts (C11)				
30899	Capacitor—0.1 mfd., 200 volts (C1, C31)				

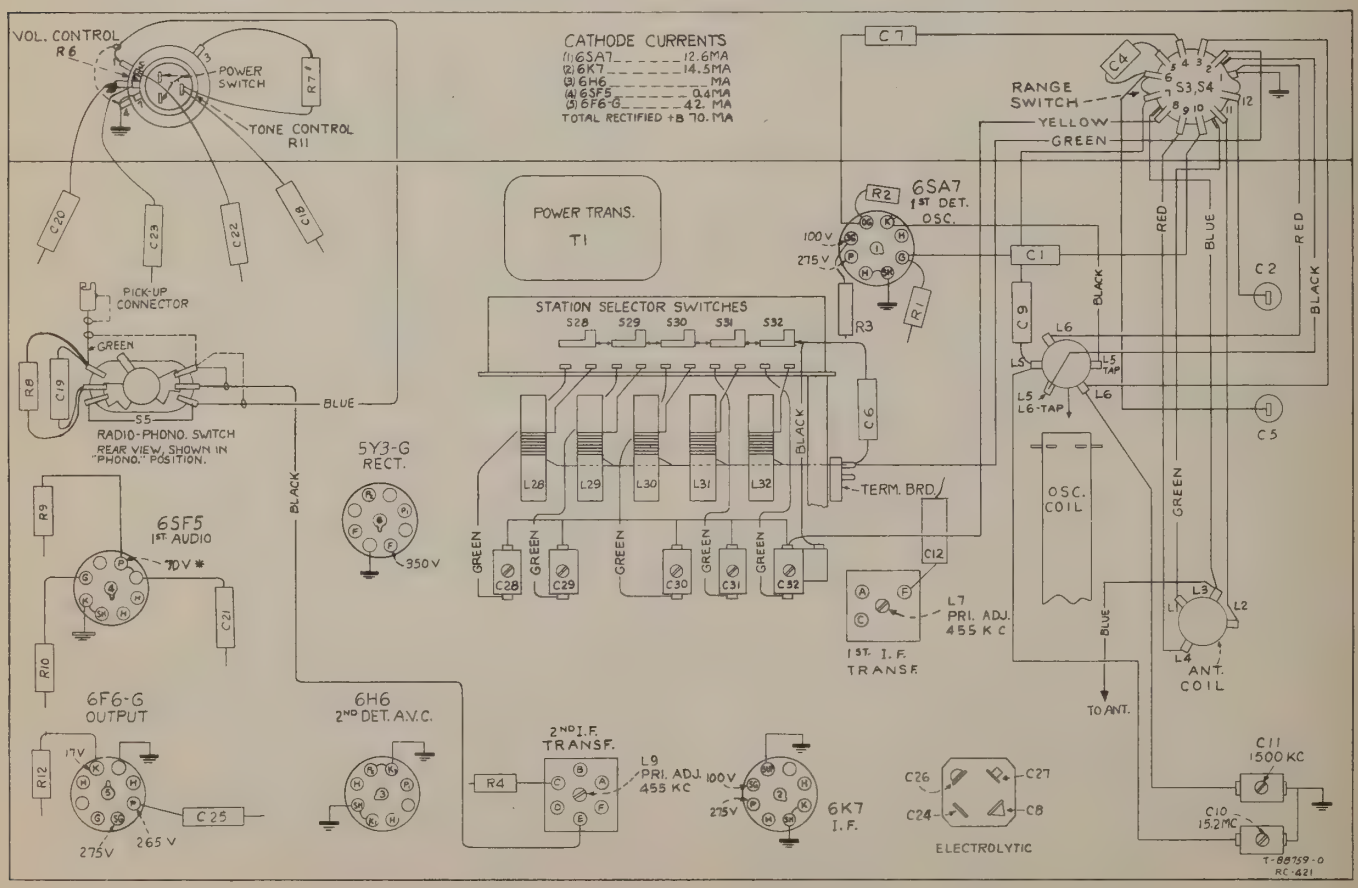
Replacement Parts continued on Page 7

RC-421 (Two-Band Model U-123)



Note the following additional d-c resistances. Voice-coil, 2 ohms; primary of output transformer, 375 ohms; 60-cycle power transformer, primary 9 ohms, secondary 735 ohms.

Precautionary Lead Dress.—Dress the oscillator grid condenser (C7) away from chassis. Leads along back of chassis must be dressed in corner of chassis and away from contact "E" of 2nd i-f transformer. Keep a-c leads against end of chassis. Dial drum must be 5/32-inch from front apron.



BOTTOM VIEW - REAR OF CHASSIS

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within approximately ± 20% with 117-volt a-c supply.

*** NOTE: Values with star (*) are operating voltages in circuits with high series-resistance. The actual measured voltages will be lower, depending on the voltmeter loading.**

STOCK No.	DESCRIPTION
31386	Core—Core and stud assembly for push button oscillator coils
31421	Drum—Tuning drive drum and hub
11891	Lamp—Dial lamp
32136	Lead—Phonograph input shielded lead and connector (U-121 and U-123)
32908	Lead—Phonograph input shielded lead and socket (U-127E only)
31419	Plate—Dial color plate
30868	Plug—2-contact female for motor leads
31420	Pointer—Dial indicator pointer
31373	Pulley—Tuning indicator drive pulley
31388	Resistor—390 ohms, 1 watt (R9)
14559	Resistor—10,000 ohms, ½ watt (R17)
12738	Resistor—27,000 ohms, ½ watt (R10)
12286	Resistor—56,000 ohms, ½ watt (R2)
13734	Resistor—120,000 ohms, ½ watt (R16)
12199	Resistor—270,000 ohms, ½ watt (R7)
30963	Resistor—820,000 ohms, ½ watt (R18)
30208	Resistor—1.2 meg., ½ watt (R30) (U127E only)
12679	Resistor—2.2 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R6)
31425	Resistor—Voltage divider resistor tapped at 22 ohms, 18,000 ohms, 8,200 ohms, and 3,900 ohms (R15, R12, R3, R11)
14887	Retainer—Indicator drive pulley retainer
31482	Screw—No. 8 square head set screw for drive drum
5040	Socket—4-contact socket for speaker cable
31364	Socket—Dial lamp socket
31251	Socket—Octal base tube socket
31418	Spring—Drive cord tension spring
31414	Switch—Selector switch for push button switch assembly (S20, S21, S22, S23, S24, S25, S12, S13, S14, S15, S16, S17)
30902	Transformer—First i.f. transformer (L5, L6, C7, C8)
30903	Transformer—Second i.f. transformer (L7, L8, C9, C10)
31445	Transformer—Power transformer, 110 volts, 25-60 cycle (T1)
31380	Transformer—Power transformer, 110 volts, 50-60 cycle (T1)
31575	Transformer—Power transformer, 110-220 volts, 50-60 cycle (T1)
	PICKUP AND ARM ASSEMBLIES Model U-121 and U-127E
31212	Base—Pickup arm pivot shaft, trip lever, and mounting base assembly
32138	Cable—Shielded cable and male plug for pickup arm
31050	Crystal—Pickup crystal and needle screw
32137	Pickup and arm complete
12539	Screw—Pickup needle screw
	PICKUP AND ARM ASSEMBLIES Model U-123 (Single-Band)
31162	Cable—Pickup arm lift cable and clips
32885	Cable—Pickup arm output cable
31156	Crystal—Pickup crystal cartridge and needle screw
32884	Pickup and arm complete
31160	Screw—Pickup needle screw
31161	Shaft—Pickup pivot arm and shaft assembly
	MOTOR ASSEMBLIES Model U-121 and U-127E
31464	Damper—Comprising 1 rubber spindle sleeve and 1 metal damper plate
32652	Field—Motor coils and laminations, 105-120 volts, 25-cycle
32650	Field—Motor coils and laminations, 105-120 volts, 50-cycle
32336	Field—Motor coils and laminations, 105-120 volts, 60-cycle
32638	Motor—105-120 volts, 25-cycle
32637	Motor—105-120 volts, 50-cycle
32558	Motor—105-120 volts, 60-cycle
30870	Plug—2-contact male for motor leads
32653	Shaft—Turntable shaft and gear for 25-cycle motor
32651	Shaft—Turntable shaft and gear for 50-cycle motor
32337	Shaft—Turntable shaft and gear for 60-cycle motor
	MOTOR ASSEMBLIES Model U-123
32956	Coil—Field coil and laminations for 25-cycle motor
32955	Coil—Field coil and laminations for 50-cycle motor
32954	Coil—Field coil and laminations for 60-cycle motor
32960	Gear—Motor spindle gear and pin
32873	Motor—Motor complete, 25-cycle, 110 volts AC.
32872	Motor—Motor complete, 50-cycle, 110 volts AC.
32871	Motor—Motor complete, 60-cycle, 110 volts, AC.
30870	Plug—2-prong male plug—used on motor leads.
32959	Spindle—Turntable spindle complete with metal pinion and fibre gear for 25-cycle motor
32958	Spindle—Turntable spindle complete with metal pinion and fibre gear for 50-cycle motor
32957	Spindle—Turntable spindle complete with metal pinion and fibre gear for 60-cycle motor
32875	Switch—Motor control switch
	MOTORBOARD ASSEMBLIES Model U-121 and U-127E
14803	Brake—Automatic brake and switch
31464	Damper—Comprising one rubber spindle sleeve, and one metal damper plate
30870	Plug—2-contact male for motor leads
32610	Rest—Rubber rest for pickup arm
30100	Springs—One set of springs for automatic brake
32743	Switch—Radio-Record switch (S27)
14804	Switch—Switch only for automatic brake (S26).
31463	Turntable—Record turntable
	MOTORBOARD ASSEMBLIES Model U-123
31149	Base—Tone arm mounting base
32876	Board—Motorboard complete with all riveted and welded posts and brackets — less operating mechanisms
14209	Bumper—Main lever rubber bumper (1)
9848	Cup—Used needle cup, rest, and lid complete.
32877	Escutcheon—Index escutcheon
31151	Guide—Pickup lift cable guide (coil spring, 80T 2-in. large) (2)
31150	Mounting—Pickup arm base rubber mounting complete
31155	Spring—Needle cup lid tension spring
	OPERATING MECHANISM Model U-123
31134	Bracket — Pickup locating lever mounting bracket (3)
32878	Cam—Cam and drive gear (42)
6808	Clutch—Trip lever friction clutch assembly (5).
31129	Cover—Cap for top of record post
32883	Damper—Motor spindle rubber drive sleeve and metal damper plate
31116	Finger—Trip lever friction finger assembly (7).
32879	Gear—Rack gear for front left-hand record post (41)
32880	Gear—Rack gear for rear right-hand record post (40)
31121	Gear—Record post gear (10)
31123	Guide—Main lever spring guide (11)
31114	Lever—Index lever assembly (12)
31137	Lever—Index lever tension spring lever (13)
31138	Lever—Locating lever and pawl assembly (14).
31113	Lever—Main lever assembly (15)
31140	Lever—Pickup lift cable lever and spring assembly (16)
31135	Lever—Pickup locating lever assembly (17)
31130	Lever—Record separator elevating lever complete with adjustment screws (18)
31132	Lever—Trip detaining lever (19)
31115	Lever—Trip lever assembly (20)
31131	Lever—Trip regulator lever (21)
31133	Pawl—Trip pawl assembly (22)
31124	Pin—Record post drive pin (23)
14207	Roller—Pickup lift cable roller and bracket assembly (24)
31118	Screw—Cone pointed set screw for trip lever hub or record post shelf
4563	Screw—Pickup lift cable screw and nuts
31117	Screw—Special screw to adjust friction clutch tension (B)
31126	Separator—Record separator knife (25)
31122	Shaft—Record separator post shaft (26)
31125	Shelf—Record post shelf assembly (27)
3676	Spring—Cam pawl tension spring on main gear (12 turns, .190-in. O.D., 4-3/64-in. lg.)
32882	Spring—Main lever tension spring (43) (18 turns, .6-in. O.D., 3-in. lg.)
14190	Spring—Pickup locating lever short spring or locating lever pawl tension spring (28) (16 turns, .180-in. O.D., 19/32-in. lg.)
31136	Spring—Index lever tension spring (30) (25 turns, .190-in. O.D., 15/16-in. lg.)
3666	Spring—Pickup lift cable tension spring (31) (20 turns, .195-in. O.D., 1-in. lg.)
31127	Spring—Record separator pressure spring (32) (8 turns, 5/8-in. O.D., 3/4-in. lg.)
14191	Spring—Trip detaining lever tension spring (33) (15 turns, .190-in. O.D., 3/4-in. lg.)
31875	Spring—Pickup locating lever tension spring (34) (14 turns, .220-in. O.D., 27/32-in. lg.)
32436	Spring—Locating lever tension spring (35) (16 turns, .182-in. O.D., 21/32-in. lg.)
32881	Turntable complete
31128	Washer—"C" washer for top of record post
	SPEAKER ASSEMBLIES (RL-70F3) Models U-121 and U-123 (Single-Band)
13866	Cap—Dust cap for cone center
12012	Coil—Field coil (L16)
11469	Coil—Hum neutralizing coil (L15)
31275	Cone—Speaker cone and voice coil (L14)
31302	Plug—4-contact male plug
31300	Speaker—Speaker complete
14358	Screw—Screw, washer, and lockwasher to hold core in yoke
31301	Transformer—Output transformer (T2)
14357	Washer—Spring washer to hold field coil

Replacement Parts (cont'd) Models U-121, U-123 (Single-Band), and U-127E

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES (RL-63H5) Model U-127E
14356	Board—3-contact speaker terminal board
13866	Cap—Cone center dust cap
12012	Coil—Field coil
11469	Coil—Hum neutralizing coil
31310	Cone—Speaker cone and voice coil
31302	Plug—4-contact male plug for speaker
14358	Screw—Screw, washer, and lockwasher to hold core in yoke
31453	Speaker complete
14355	Transformer—Output transformer
14357	Washer—Spring washer to hold field coil
	MISCELLANEOUS ASSEMBLIES
32798	Button—Push button
13103	Cap—Pilot lamp cap (bullseye) (For Model U-123 only)
31487	Clip—Spring clip to mount dial scale
31095	Cover—One set protective discs for call letter markers
32742	Dial—Glass dial scale (For Models U-121 and U-123)
31429	Dial—Glass dial scale (For Model U-127E only)
31667	Escutcheon—Dial scale escutcheon
32799	Escutcheon—Push button escutcheon
30698	Hinge—Cabinet lid hinge (For Models U-121 and U-123)
31103	Hinge—Cabinet lid hinge (For Model U-127E only)
32562	Holder—Needle card holder (For Model U-121 only)
31391	Knob—Tone control knob
31355	Knob—Dummy or radio-record switch knob
30773	Knob—Volume control or tuning knob
30991	Marker—One set station call letter markers
31054	Mounting—Pickup arm rubber mounting, washers, and nuts (For Model U-121 and U-127E only)
32870	Screen—Phonograph compartment lamp screen (For Model U-123 only)
31470	Spring—Motorboard mounting springs, bolts, and washers (For Model U-123 only) (4 required)
32721	Spring—Retaining spring for push button
30330	Spring—Retaining spring for tone control knob
14270	Spring—Retaining spring for tuning, volume control, or switch knob
11831	Support—Cabinet lid support (For Model U-121 only)
31478	Support—Cabinet lid support (For Model U-123 only)
30946	Support—Cabinet lid support (For Model U-127E only)
32743	Switch—Radio-Record switch (For Model U-123 only)

Replacement Parts Model U-123 (Two-Band)

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-421) Model U-123 (Two Band)
32136	Cable—Phono. input cable and socket
31379	Capacitor—Dual trimmer—comprising one 3-30 mmfd. and one 2-10 mmfd. sections (C10, C11)
13605	Capacitor—27 mmfd. (C19)
12723	Capacitor—56 mmfd. (C7)
14262	Capacitor—109 mmfd. (C13, C14)
12404	Capacitor—120 mmfd. (C15, C16)
14712	Capacitor—180 mmfd. (C17)
30232	Capacitor—220 mmfd. (C21)
12952	Capacitor—300 mmfd. (C1)
30608	Capacitor—510 mmfd. (C4)
32714	Capacitor—730 mmfd. (C6)
13895	Capacitor—5,600 mmfd. (C9)
4838	Capacitor—.005 mfd. (C23, C25)
4937	Capacitor—.01 mfd. (C20, C22)
4870	Capacitor—.025 mfd. (C18)
32787	Capacitor—.05 mfd. (C12)
33014	Capacitor—Electrolytic — comprising three 10 mfd. and one 20 mfd. sections (C8, C24, C26, C27)
32705	Capacitor—Push button trimmer capacitor bank (C28, C29, C30, C31, C32)
31382	Clip—Push button coil mounting clip
32706	Coil—Antenna coil (L1, L2, L3, L4)
32707	Coil—Oscillator coil (L5, L6)
31385	Coil—Push button oscillator coil — less core, 550-950 kc (L28)
32704	Coil—Push button oscillator coil — less core, 590-1,020 kc (L29)
32340	Coil—Push button oscillator coil — less core, 690-1,225 kc (L30)
31383	Coil—Push button oscillator coil — less core, 890-1,500 kc (L31, L32)
32249	Condenser—2-gang variable (C2, C3, C5)
32355	Control—Volume control, tone control, and power switch (R6, R11, S1)
32634	Cord—Drive cord
31386	Core—Core and stud for coil, Stock Nos. 31383, 31385, and 32704
30846	Core—Core and stud for coil, Stock No. 32340
32713	Core—Core and stud for oscillator coil, Stock No. 32707
32266	Drum—Condenser drive cord drum
32711	Indicator—Dial indicator pointer
31480	Lamp—Dial lamp socket
32710	Plate—Dial color plate and pointer track
5119	Plug—3-contact female for speaker cable
30868	Plug—Motor cable plug
32289	Pulley—Indicator drive cord pulley
12261	Resistor—390 ohms, 1 watt (R12)
14559	Resistor—10,000 ohms, ½ watt (R7)
33489	Resistor—15,000 ohms, 2.5 watt (R3)
14284	Resistor—22,000 ohms, 1/10 watt (R5)
12454	Resistor—33,000 ohms, ½ watt (R2)
12285	Resistor—470,000 ohms, ½ watt (R9)
13730	Resistor—1 meg., ½ watt (R1)
12201	Resistor—1.5 meg., ½ watt (R8)
12679	Resistor—2.2 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R10)
30340	Retainer—Pulley retaining clip
14343	Retainer—Tuning knob shaft retaining ring
4669	Screw—No. 8-32 x ¼ square head set screw for drum
32712	Shaft—Tuning knob shaft and pulley
31319	Socket—Octal base tube socket
31418	Spring—Drive cord tension spring
32703	Switch—Push button switch (S28, S29, S30, S31, S32)
33113	Switch—Radio record switch (S5)
32702	Switch—Range switch (S3, S4)
14376	Transformer—First i.f. transformer (L7, L8, C13, C14)
14308	Transformer—Second i.f. transformer (L9, L10, C15, C16, C17, R5)
33112	Transformer—Power transformer—105-125 volts, 50-60 cycle (T1)
	PICKUP AND ARM ASSEMBLIES
33096	Arm—Pickup arm complete — less crystal cartridge, needle screw, and cable
31162	Cable—Pickup arm lift cable and clips
32885	Cable—Output cable and plug
31156	Crystal—Pickup crystal cartridge and needle screw
33114	Damper—Viscoloid damper for crystal armature
31160	Screw—Pickup needle screw
31161	Shaft—Pickup pivot arm and shaft assembly
	MOTOR ASSEMBLIES, MOTORBOARD ASSEMBLIES, and OPERATING MECHANISM
	Same as in Single-Band U-123
	SPEAKER ASSEMBLIES (RL-70H6) Model U-123 (Two Band)
31825	Cap—Dust cap for cone center
11469	Coil—Hum neutralizing coil (L12)
33116	Coil—Speaker field coil (L11)
31275	Cone—Speaker cone and voice coil (L13)
5118	Plug—3-prong male for speaker
33115	Speaker—Speaker complete
14358	Screw—Screw, washer, and lockwasher to hold core in yoke
31301	Transformer—Output transformer (T2)
14357	Washer—Spring washer to hold field coil
	MISCELLANEOUS ASSEMBLIES Model U-123 (Two Band)
32798	Button—Push button
13103	Cap—Pilot lamp cap (bullseye)
31487	Clip—Spring clip to mount dial scale
31095	Cover—One set protective discs for call letter markers
33117	Dial—Glass dial scale
31667	Escutcheon—Dial scale escutcheon
33118	Escutcheon—Push button escutcheon
30698	Hinge—Cabinet lid hinge
31391	Knob—Tone control knob
31355	Knob—Tuning or radio-record switch knob
14359	Knob—Radio-record switch knob
30773	Knob—Volume control knob
30991	Marker—One set station call letter markers
32870	Screen—Phonograph compartment lamp screen
31470	Spring—Motorboard mounting springs, bolts, and washers (4 required)
32721	Spring—Retaining spring for push button
30330	Spring—Retaining spring for tone control knob
14270	Spring—Retaining spring for tuning, volume control, or switch knob
4982	Spring—Retaining spring for radio-record switch knob
31478	Support—Cabinet lid support

RCA Victor

MODEL 5Q6

Chassis No. RC-477A

Five-Tube, Three-Band, AC-DC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast ("A" Band)	540-1,720 kc (555-174 m)
Medium Wave ("B" Band)	2.3-7.0 mc (130-42.8 m)
Short Wave ("C" Band)	7.0-22 mc (42.8-13.6 m)

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SA7	Detector-Oscillator
(2) RCA-6K7	I-F Amplifier
(3) RCA-6SQ7	2nd Detector, A.V.C., and A-F Amplifier
(4) RCA-25L6-G	Power Output
(5) RCA-25Z6-G	Rectifier
Ballast Tube	RCA Stock No. 32849 for 210-250 volt operation.

PILOT LAMP ..... Mazda No. 47, 6.3 volts, 0.15 amp.

POWER OUTPUT RATING

(210-250 Volt Operation)

Undistorted	1.5 watts
Maximum	2.7 watts

LOUDSPEAKER (84557-2)

Type	5-inch
V. C. Impedance	2.2 ohms at 400 cycles

POWER SUPPLY RATINGS

210-250 volts, 50-60 cycles	125 watts
210-250 volts, direct current	125 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	9¾	13½	8⅞
Chassis Base Dimensions (inches)	2¾	12	5¼

Over-all Chassis Height ..... 7⅛ inches

Weight ..... 17 lbs. (Net)

Tuning Drive Ratio ..... 17 to 1

General Description

Model 5Q6 is a three-band, table-type superheterodyne receiver housed in a plastic cabinet. It is designed for operation on 210-250 volts, 50-60 cycles AC, or 210-250 volts DC.

Features of design include: New type single-ended tubes (6SA7 and 6SQ7); magnetite core I-F transformers; magnetite core oscillator adjustment for "A" band; automatic volume control; bass compensation; electrodynamic loudspeaker; high-frequency tone control; straight-line dial; tropic-proof construction; streamline moulded cabinet.

Power Supply Polarity:

For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, a similar reversal of the plug may reduce hum.

First Edition

Trademark "RCA Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U.S.A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver ground lead (black), and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 135° mark on the drum scale must be vertical, and directly under the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of a set screw, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

For additional details, refer to booklet "RCA Victor Receiver Alignment."

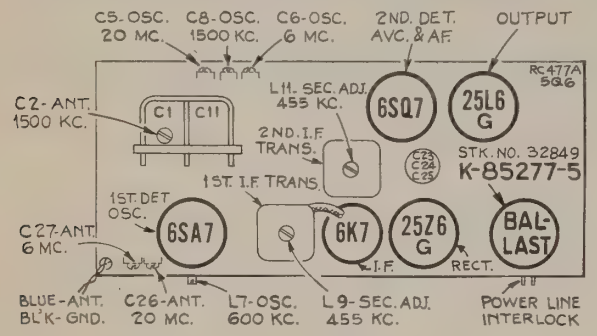
Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	"A" Band quiet point between 550-750 kc	L10 and L11 (2nd I.F. trans.)
2	Tuning condenser stator (osc.) in series with .01 mfd. **	455 kc		L8 and L9 (1st I.F. trans.)
3	Antenna lead in series with 200 mmfd.	600 kc	600 kc (33°) "A" Band	L7†
4		1,500 kc	1,500 kc (152.4°) "A" Band	C2 (ant.) C8 (osc.)
5	Repeat steps 3 and 4			
6	Antenna lead in series with 400 ohms	20 mc	20 mc (155.4°) "C" Band	C5 (osc.)* C26 (ant.)
7		6 mc	6 mc (148°) "B" Band	C6 (osc.)* C27 (ant.)
8	Antenna lead in series with 200 mmf.	1,500 kc	1,500 kc (152.4°) "A" Band	C8 (osc.)

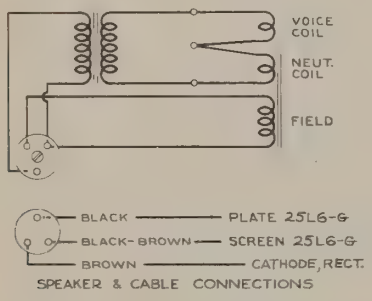
* Use minimum capacity peak if two peaks can be obtained.

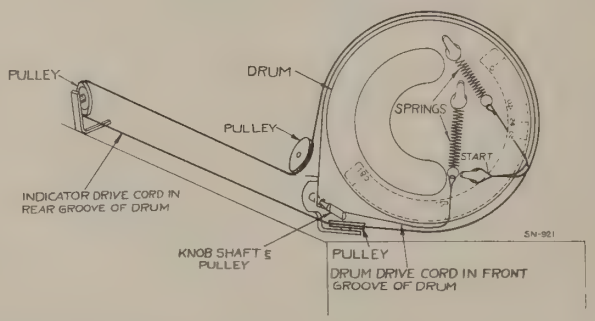
† Rock gang condenser slightly while adjusting L7.

** Make test-oscillator connection to lug on tuning condenser stator (oscillator section) in series with .01 mfd. condenser.

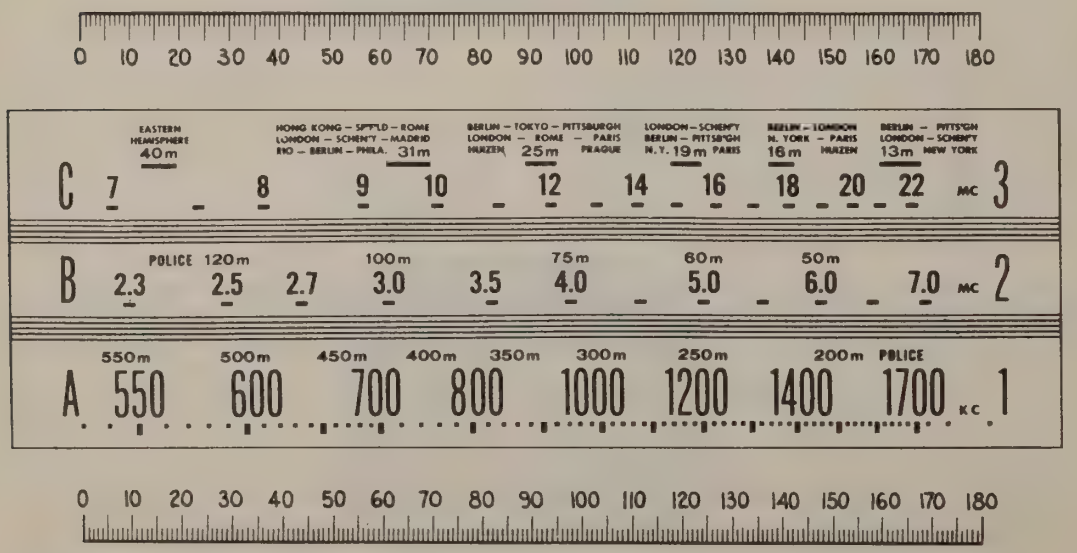
Note.—Oscillator tracks 455 kc above signal on all bands.





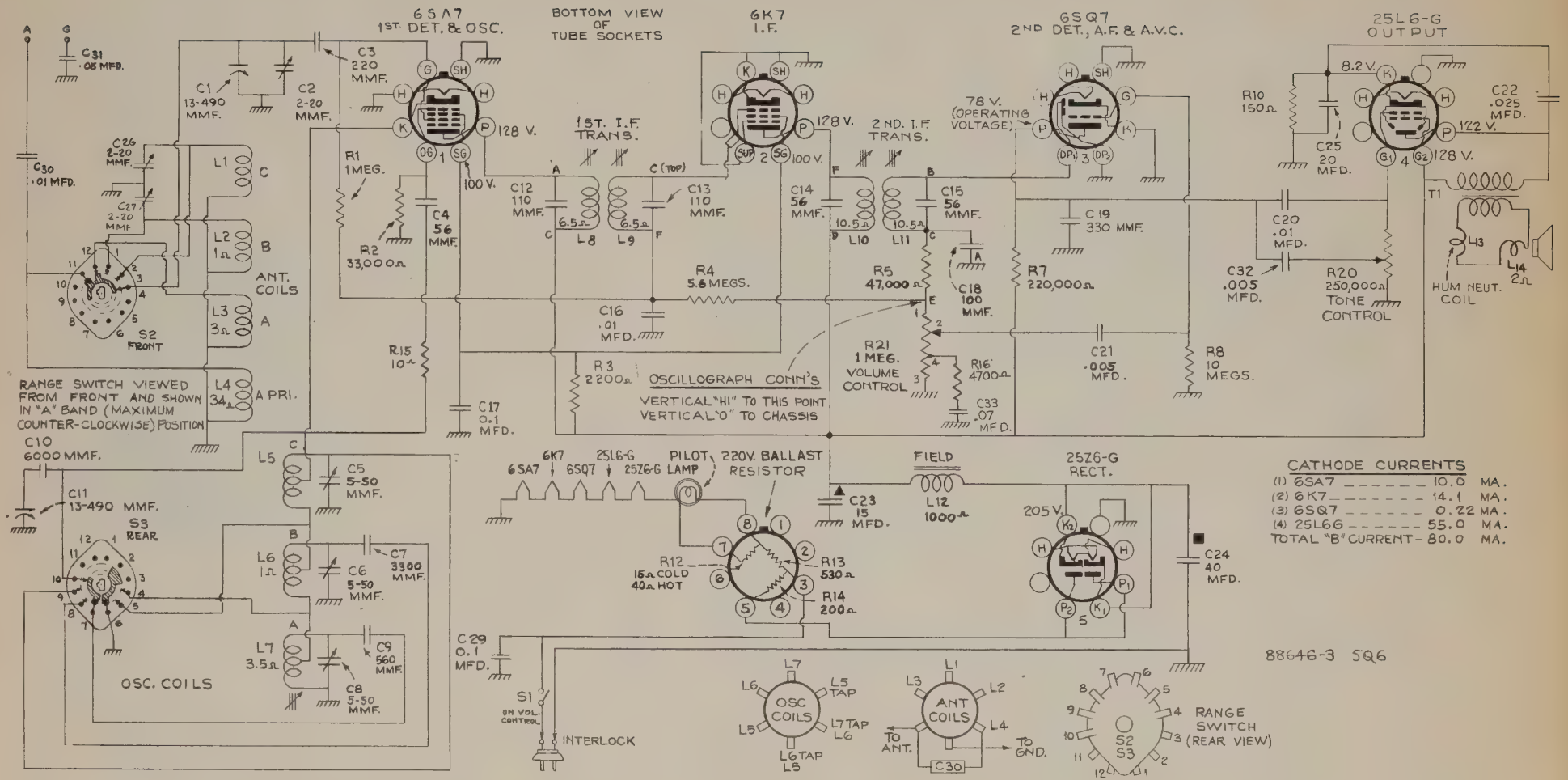


Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
EASTERN HEMISPHERE 40m
HONG KONG – SPT'LD – ROME LONDON – SCHEN'Y – MADRID RIO – BERLIN – PHILA. 31m
BERLIN – TOKYO – PITTSBURGH LONDON – ROME – PARIS HUIZEN 25m PRAGUE
LONDON – SCHEN'Y BERLIN – PITTSB'GH N.Y. 19m PARIS
BERLIN – LONDON N. YORK – PARIS 16m HUIZEN
BERLIN – PITTS'GH LONDON – SCHEN'Y 13m NEW YORK
C 7 8 9 10 12 14 16 18 20 22 MC 3
POLICE 120m
B 2.3 2.5 2.7 100m 3.0 3.5 75m 4.0 60m 5.0 50m 6.0 7.0 MC 2
550m 500m 450m 400m 350m 300m 250m 200m POLICE
A 550 600 700 800 1000 1200 1400 1700 KC 1
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 33° on the calibration scale corresponds to approximately 7.9 mc on "C" band, and 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."


6SA7
1ST. DET. & OSC.
BOTTOM VIEW OF TUBE SOCKETS
6K7
I.F.
6SQ7
2ND DET., A.F. & A.V.C.
25L6-G
OUTPUT
C31 .05 MFD.
C1 13-490 MMF.
C2 2-20 MMF.
C3 220 MMF.
C26 2-20 MMF.
C27 2-20 MMF.
C30 .01 MFD.
L1 C
L2 1Ω B
L3 3Ω A
L4 34Ω A PRI.
ANT. COILS
S2 FRONT
RANGE SWITCH VIEWED FROM FRONT AND SHOWN IN "A" BAND (MAXIMUM COUNTER-CLOCKWISE) POSITION
R1 1MEG.
R2 33,000Ω
C4 56 MMF.
128 V.
100 V.
1ST. I.F. TRANS.
C12 110 MMF.
C13 110 MMF.
6.5Ω
L8
L9
C (TOP)
R4 5.6 MEGS.
C16 .01 MFD.
R15 10Ω
C17 0.1 MFD.
R3 2200Ω
OSCILLOGRAPH CONN'S
VERTICAL "HI" TO THIS POINT
VERTICAL "O" TO CHASSIS
2ND. I.F. TRANS.
C14 56 MMF.
C15 56 MMF.
10.5Ω
L10
L11
R5 47,000Ω
C18 100 MMF.
R21 1 MEG. VOLUME CONTROL
R16 4700Ω
C33 .07 MFD.
78 V. (OPERATING VOLTAGE)
C19 330 MMF.
R7 220,000Ω
C21 .005 MFD.
R8 10 MEGS.
R10 150Ω
C25 20 MFD.
8.2 V.
122 V.
C22 .025 MFD.
C20 .01 MFD.
C32 .005 MFD.
R20 250,000Ω TONE CONTROL
T1
L13
L14 2Ω
HUM NEUT. COIL
C10 6000 MMF.
C11 13-490 MMF.
S3 REAR
L5 C
L6 B 1Ω
L7 A 3.5Ω
C5 5-50 MMF.
C6 5-50 MMF.
C7 3300 MMF.
C8 5-50 MMF.
C9 560 MMF.
OSC. COILS
6K7 6SA7 6SQ7 25Z6-G 25L6-G
PILOT LAMP
220V. BALLAST RESISTOR
R12 15Ω COLD 40Ω HOT
R13 530Ω
R14 200Ω
FIELD
L12 1000Ω
C23 15 MFD.
25Z6-G RECT.
205 V.
C24 40 MFD.
C29 0.1 MFD.
S1 ON VOL. CONTROL
INTERLOCK
OSC COILS
L7 L6 L5 L5 TAP L7 TAP L6 L6 TAP L5
ANT COILS
L1 L2 L3 L4
TO ANT.
TO GND.
C30
S2 S3
RANGE SWITCH (REAR VIEW)
CATHODE CURRENTS
(1) 6SA7 ------- 10.0 MA.
(2) 6K7 ------- 14.1 MA.
(3) 6SQ7 ------- 0.22 MA.
(4) 25L6G ------- 55.0 MA.
TOTAL "B" CURRENT - 80.0 MA.
88646-3 SQ6

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-477A)
32849	Ballast—Ballast resistor (R12, R13, R14)
32832	Bracket—Drive bracket, pulleys and tuning knob—shaft complete
12723	Capacitor—56 mmfd. (C4)
30949	Capacitor—56 mmfd. (C14, C15)
14262	Capacitor—110 mmfd. (C12, C13)
32238	Capacitor—110 mmfd. (C18)
12694	Capacitor—220 mmfd. (C3)
12952	Capacitor—330 mmfd. (C19)
12537	Capacitor—560 mmfd. (C9)
31403	Capacitor—3,300 mmfd. (C7)
31405	Capacitor—6,000 mmfd. (C10)
32830	Capacitor—Trimmer capacitor bank, 2 sections 2-20 mmfd. (C26, C27)
32829	Capacitor—Trimmer capacitor bank, 3 sections 5-60 mmfd. (C5, C6, C8)
4838	Capacitor—.005 mmfd. (C21, C32)
14393	Capacitor—.01 mfd. (C16, C20, C30)
4870	Capacitor—.025 mfd. (C22)
4886	Capacitor—.05 mfd. (C31)
14626	Capacitor—.07 mfd. (C33)
4839	Capacitor—0.1 mfd. (C17, C29)
32851	Capacitor—Electrolytic comprising 1 section of 40 mfd. 1 section of 15 mfd. and 1 section of 20 mfd. (C23, C24, C25)
32821	Coil—Antenna coil A, B, C bands (L1, L2, L3, L4)
32824	Coil—Oscillator coil A, B, C bands (L5, L6, L7)
32817	Condenser—2 gang variable condenser (C1, C2, C11)
34224	Control—Tone control (R20)
34851	Control—Volume control and power switch (R21, S1)
32634	Cord—Variable tuning condenser drive drum cord
32635	Cord—Indicator drive cord
32713	Core—Core and stud for oscillator coil adjustment
32835	Drum—Drive cord drum
31480	Lamp—Dial lamp
5119	Plug—3-contact female for speaker cable
32834	Pulley—Drive cord pulley and mounting bracket (1 pulley)
32849	Resistor—Ballast resistor (R12, R13, R14)
13988	Resistor—10 ohms, ½ watt (R15)
30880	Resistor—150 ohms, ½ watt (R10)
3526	Resistor—2,200 ohms, ½ watt (R3)
30146	Resistor—4,700 ohms, ½ watt (R16)
12454	Resistor—33,000 ohms, ½ watt (R2)
5132	Resistor—47,000 ohms, 1/10 watt (R5)
12264	Resistor—220,000 ohms, ½ watt (R7)
13730	Resistor—1 meg., ½ watt (R1)
11668	Resistor—5.6 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R8)
32848	Screw—No. 8-32 square head set screw for drum
31365	Socket—Dial lamp insulated socket
31251	Socket—Octal base tube socket
31418	Spring—Drive cord or pointer cable tension spring
32819	Switch—Range switch (S2, S3)
14376	Transformer—First i.f. transformer (L8, L9, C12, C13)
32825	Transformer—Second i.f. transformer (L10, L11, C14, C15, C18, R5)
32849	Tube—Ballast resistor (R12, R13, R14)
	SPEAKER ASSEMBLIES (84557-2)
32923	Coil—Speaker field coil (L12)
32922	Cone—Speaker cone and voice coil in metal housing (L14)
5118	Plug—3-contact male for speaker
32924	Transformer—Output transformer (T1)
	MISCELLANEOUS ASSEMBLIES
32837	Dial—Glass dial scale
32845	Frame—Dial frame complete with back plate shaft retainer, dial bracket and lamp bracket
32847	Indicator—Station selector indicator and carriage
32844	Knob—Black range switch knob
33085	Knob—Black-tone control or tuning knob
32842	Knob—Black volume control and power switch knob
32839	Knob—Brown tone control or tuning knob
33090	Knob—Ivory range switch knob
33089	Knob—Ivory volume control and power switch knob
4393	Screw—No. 8-32 set screw for knobs
32846	Shaft—Indicator guide shaft
14270	Spring—Retaining spring for knobs, Stock No. 32839 and 33085

RCA Victor

MODEL 5Q8

Chassis No. RC-396B

Five-Tube, Three-Band, AC-DC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Long Wave (X)	145-405 kc (2069-740 m)
Medium Wave (A)	540-1720 kc (555-174 m)
Short Wave (C)	5.8-18 mc (51.7-16.6 m)

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SA7	Detector-Oscillator
(2) RCA-6K7	I-F Amplifier
(3) RCA-6SQ7	2nd Detector, A.V.C., and A-F Amplifier
(4) RCA-25L6-G	Power Output
(5) RCA-25Z6-G	Rectifier
Ballast Tubes	RCA Stock No. 32544 for 105-125 volt operation; RCA Stock No. 32850 for 210-250 volt operation.

PILOT LAMP ..... Mazda No. 47, 6.3 volts, 0.15 amp.

POWER OUTPUT RATING

(210-250 Volt Operation)	
Undistorted	1.5 watts
Maximum	2.7 watts
(105-125 Volt Operation)	
Undistorted	1.7 watts
Maximum	2.9 watts

LOUDSPEAKER

Type	5-inch
V. C. Impedance	3.0 ohms at 400 cycles

POWER SUPPLY RATINGS

105-125 volts, AC-DC	65 watts
210-250 volts, AC-DC	125 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	9¾	13½	8⅞
Chassis Base Dimensions (inches)	2¾	12	5¼
Over-all Chassis Height			7⅛ inches
Weight			17 lbs. (Net)
Tuning Drive Ratio			17 to 1

General Description

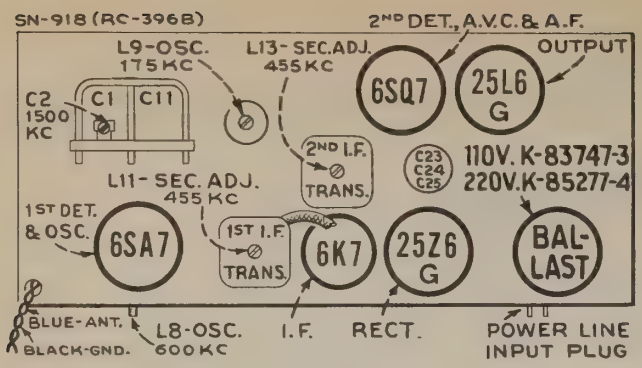
(Model 5Q8E is brown; 5Q8F is black; 5Q8G is ivory; and 5Q8H is maroon.)

Model 5Q8 is a three-band, table-type, superheterodyne receiver housed in a plastic cabinet. It is designed to cover the long wave range of 145 to 405 kilocycles, the standard broadcast range of 540 to 1720 kilocycles, and the short wave range of 5.8 to 18 megacycles. The 5Q8 may be used for either 105-125 volt operation or 210-250 volt operation by selecting the proper ballast tube, as listed above under "ELECTRICAL SPECIFICATIONS".

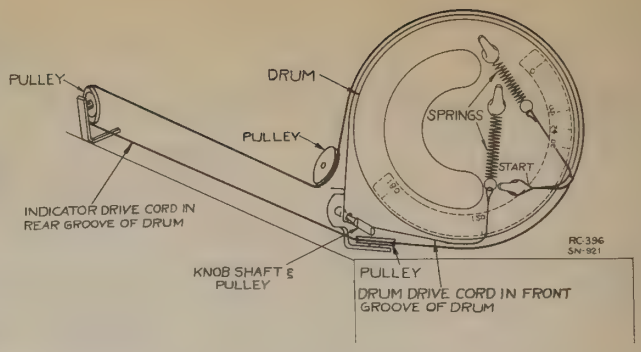
Features of design include: New type, single-ended tubes (6SA7 and 6SQ7); magnetite-core I-F transformers; magnetite-core oscillator coils for "X" and "A" bands; automatic volume control; straight-line, edge-lighted dial; super-sensitive permanent-magnet dynamic speaker.

First Edition

Printed in U. S. A.



Tube and Trimmer Locations



Arrangement of Drive Cords for Tuning Condenser and Dial Indicator

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

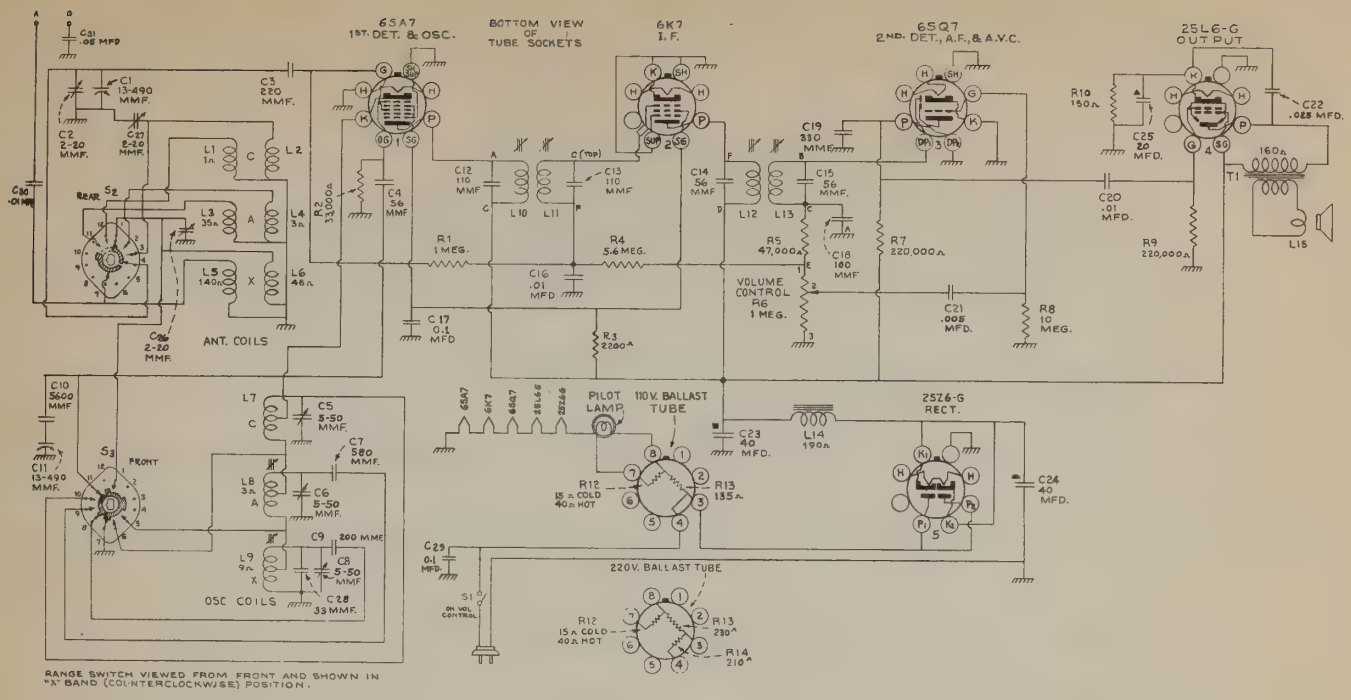
As the first step in r-f alignment, check the position of the drum. The 135° mark on the drum scale must be vertical, and directly under the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of one set screw, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap in series with .01 mfd.	455 kc	"A" Band Quiet Point between 550-750 kc	L12 and L13 (2nd I-F Trans.)
2	6SA7 det. grid in series with .01 mfd.	455 kc		L10 and L11 (1st I-F Trans.)
3	Ant. terminal in series with 200 mmf.	1,500 kc	1,500 kc (152.4°) "A" Band	C6 (osc.) C2 (ant.)
4	Ant. terminal in series with 200 mmf.	600 kc	600 kc (33°) "A" Band	L8 (osc.)
5	Repeat steps 3 and 4			
6	Ant. terminal in series with 200 mmf.	360 kc	360 kc (151.5°) "X" Band	C8 (osc.) C26 (ant.)
7	Ant. terminal in series with 200 mmf.	175 kc	175 kc (53.3°) "X" Band	L9 (osc.)
8	Repeat steps 6 and 7			
9	Ant. terminal in series with 300 ohms	15.2 mc	15.2 mc (147.2°) "C" Band	C5 (osc.)* C27 (ant.)
10	Ant. terminal in series with 200 mmf.	360 kc	360 kc (151.5°) "X" Band	C8 (osc.)
11	Ant. terminal in series with 200 mmf.	1,500 kc	1,500 kc (152.4°) "A" Band	C6 (osc.)

*Use minimum capacity peak if two can be obtained. Check to determine that C5 is adjusted to correct peak by tuning receiver to approximately 14.29 mc where a weaker signal should be received.

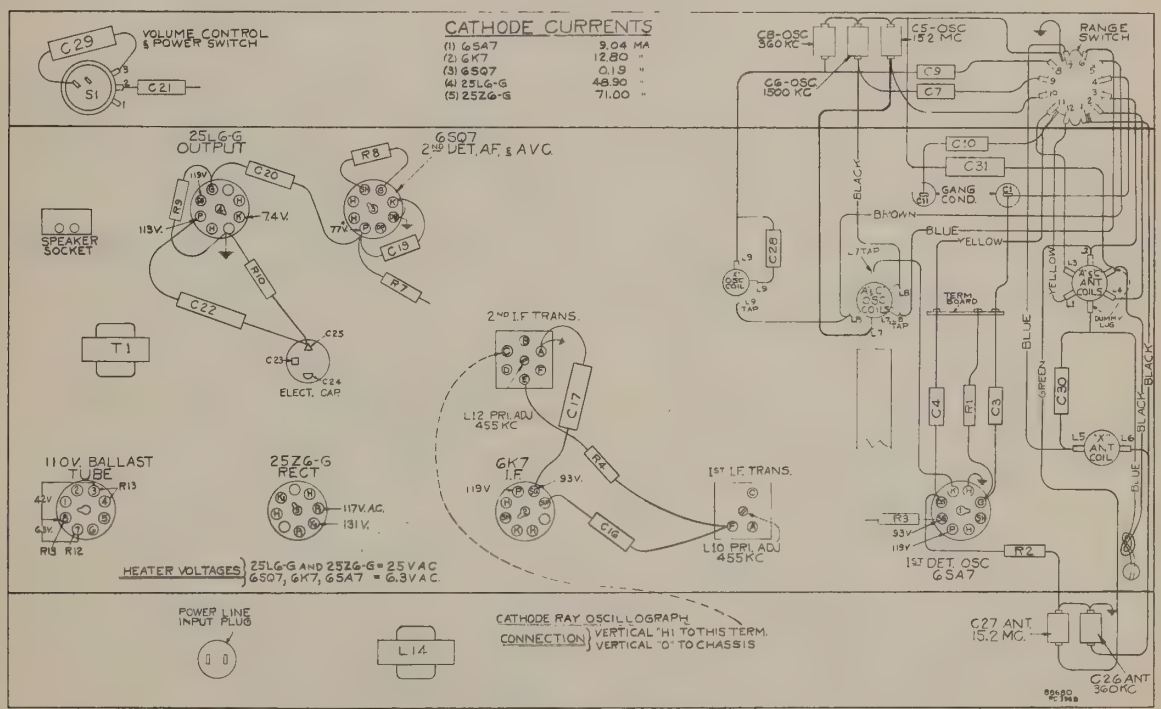
NOTE: Oscillator tracks **above** signal on all bands.



Schematic Circuit Diagram

Precautionary Lead Dress:

1. Lead from 2nd I-F transformer to volume control should be kept close to the chassis and dressed against front apron.
2. C-10 should be dressed away from the antenna section of the variable condenser (C-1).

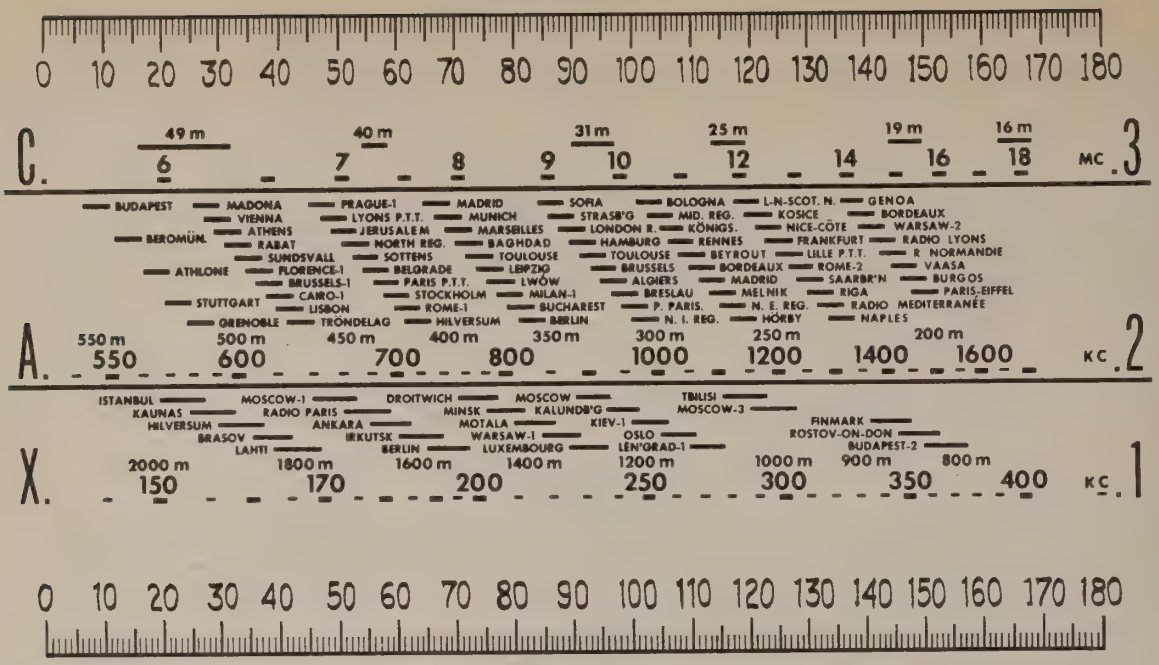

CATHODE CURRENTS
(1) 6SA7 9.04 MA
(2) 6K7 12.80 "
(3) 6SQ7 0.19 "
(4) 25L6-G 48.90 "
(5) 25Z6-G 71.00 "
VOLUME CONTROL & POWER SWITCH
25L6-G OUTPUT
6SQ7 2ND DET. AF, & AVC.
SPEAKER SOCKET
2ND I.F. TRANS.
L12 PRI. ADJ 455 KC
6K7 I.F.
1ST I.F. TRANS.
L10 PRI. ADJ 455 KC
110 V. BALLAST TUBE
25Z6-G RECT.
117 V. AC.
131 V.
1ST DET. OSC 6SA7
HEATER VOLTAGES 25L6-G AND 25Z6-G = 25 V A.C. 6SQ7, 6K7, 6SA7 = 6.3 V A.C.
POWER LINE INPUT PLUG
CATHODE RAY OSCILLOGRAPH CONNECTION VERTICAL "HI" TO THIS TERM. VERTICAL "O" TO CHASSIS
C8-OSC 360 KC
C6-OSC 1500 KC
C5-OSC 15.2 MC
RANGE SWITCH
GANG COND.
TERM. BOARD
C27 ANT. 15.2 MC.
C26 ANT 360 KC
BOTTOM VIEW - REAR OF CHASSIS

R-F Wiring Diagram and Socket Voltages

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ±20% with 117-volt a-c supply.

* **NOTE:** Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.

Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
C.
49 m 40 m 31 m 25 m 19 m 16 m
6 7 8 9 10 12 14 16 18 MC 3
BUDAPEST MADONA PRAGUE-1 MADRID SOFIA BOLOGNA L-N-SCOT. N. GENOA
VIENNA LYONS P.T.T. MUNICH STRASB'G MID. REG. KOSICE BORDEAUX
ATHENS JERUSALEM MARSEILLES LONDON R. KÖNIGS. NICE-CÔTE WARSAW-2
BEROMÜN RABAT NORTH REG. BAGHDAD HAMBURG RENNES FRANKFURT RADIO LYONS
SUNDSVALL SOTTENS TOULOUSE TOULOUSE BEYROUT LILLE P.T.T. R NORMANDIE
ATHLONE FLORENCE-1 BELGRADE LEIPZIG BRUSSELS BORDEAUX ROME-2 VAASA
BRUSSELS-1 PARIS P.T.T. LWÓW ALGIERS MADRID SAARBR'N BURGOS
STUTTGART CAIRO-1 STOCKHOLM MILAN-1 BRESLAU MELNIK RIGA PARIS-EIFFEL
LISBON ROME-1 BUCHAREST P. PARIS. N. E. REG. RADIO MEDITERRANÉE
GRENOBLE TRÖNDELAG HILVERSUM BERLIN N. I. REG. MÖRBY NAPLES
A.
550 m 500 m 450 m 400 m 350 m 300 m 250 m 200 m
550 600 700 800 1000 1200 1400 1600 KC 2
ISTANBUL MOSCOW-1 DROITWICH MOSCOW TBILISI
KAUNAS RADIO PARIS MINSK KALUNDB'G MOSCOW-3
HILVERSUM ANKARA MOTALA KIEV-1 FINMARK
BRASOV IRKUTSK WARSAW-1 OSLO ROSTOV-ON-DON
LAHTI BERLIN LUXEMBOURG LEN'GRAD-1 BUDAPEST-2
X.
2000 m 1800 m 1600 m 1400 m 1200 m 1000 m 900 m 800 m
150 170 200 250 300 350 400 KC 1
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 33° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC396B)		5132	Resistor—47,000 ohms, 1/10 watt (R5)	
	Ballast—Ballast resistor tube, 110 volt operation (R12, R13)		12264	Resistor—220,000 ohms, ½ watt (R7, R9)	
32850	Ballast—Ballast resistor tube, 220 volt operation (R12, R13, R14)		13730	Resistor—1 meg., ½ watt (R1)	
32832	Bracket—Drive bracket pulleys, and tuning knob shaft complete		11668	Resistor—5.6 meg., ½ watt (R4)	
32635	Cable—Pointer drive cable		13601	Resistor—10 meg., ½ watt (R8)	
12581	Cap—First I.F. transformer shield cap		14887	Retainer—Tuning knob shaft retainer	
12948	Capacitor—33 mmfd. (C28)		32848	Screw—No. 8-32 square head set screw for drum	
12723	Capacitor—56 mmfd. (C4)		32833	Shaft—Tuning knob shaft, eyelet and retainer	
30949	Capacitor—56 mmfd. (C14, C15)		31365	Socket—Dial lamp insulated socket	
14262	Capacitor—109 mmfd. (C12, C13)		31251	Socket—Octal base tube socket	
32238	Capacitor—110 mmfd. (C18)		14278	Socket—Phonograph socket	
30232	Capacitor—200 mmfd. (C9)		30956	Socket—Speaker socket	
12694	Capacitor—220 mmfd. (C3)		31418	Spring—Drive cord or pointer cable tension spring	
12952	Capacitor—330 mmfd. (C19)		32820	Switch—Range switch (S2, S3)	
32853	Capacitor—580 mmfd. (C7)		14376	Transformer—First i.f. transformer (L10, L11, C12, C13)	
13895	Capacitor—5,600 mmfd. (C10)		32825	Transformer—Second i.f. transformer (C14, C15, C18, R5, L12, L13)	
32830	Capacitor—Trimmer capacitor bank, 2 sections 2-20 mmfd. (C26, C27)		32029	Transformer—Output transformer (T1)	
32829	Capacitor—Trimmer capacitor bank 3 sections 5-50 mmfd. (C5, C6, C8)			Tube—Ballast resistor tube, 110 volt operation (R12, R13)	
14393	Capacitor—.01 mfd. (C16, C20)		32850	Tube—Ballast resistor tube, 220 volt operation (R12, R13, R14)	
4858	Capacitor—.01 mfd. (C30)		32818	Volume control and switch (R6, S1)	
4870	Capacitor—.025 mfd. (C22)			**SPEAKER ASSEMBLIES (84556-1)**	
4886	Capacitor—.05 mfd. (C31)		32926	Cone—Cone and voice coil in metal housing (L15)	
4839	Capacitor—0.1 mfd. (C17, C29)		5133	Pin—Speaker lead pin	
32826	Capacitor—Electrolytic, 2 sections 40 mfd., 1 section 20 mfd. (C23, C24, C25)		32925	Speaker—Complete	
32822	Coil—Antenna coil—A, C bands (L1, L2, L3, L4)			**MISCELLANEOUS ASSEMBLIES**	
32823	Coil—Antenna coil—X band (L5, L6)		32845	Bracket—Dial mounting bracket and lamp bracket assembly—less pointer and pointer slide rods	
32707	Coil—Oscillator coil—A, C bands (L7, L8)		32836	Cord—Power cord complete with plugs	
32931	Coil—Oscillator coil—X band (L9)		32838	Dial—Dial scale	
32817	Condenser—2-gang variable condenser (C1, C2, C11)		32844	Knob—Black range switch knob	
32634	Cord—Drive cord		33088	Knob—Black tuning knob	
32713	Core—Core and stud for oscillator coil adjustment		32842	Knob—Black volume control knob	
32835	Drum—Drive cord drum		32840	Knob—Brown tuning knob	
31480	Lamp—Dial lamp		33090	Knob—Ivory range switch knob	
32828	Plug—Line plug for rear of chassis		33092	Knob—Ivory tuning knob	
32834	Pulley—Pointer cord pulley and bracket		33089	Knob—Ivory volume control knob	
32709	Reactor—Filter reactor (L14)		33565	Knob—Maroon range switch	
	Resistor—Ballast resistor tube, 110 volt operation (R12, R13)		33094	Knob—Maroon tuning knob	
32850	Resistor—Ballast resistor tube, 220 volt operation (R12, R13, R14)		33564	Knob—Maroon volume control	
30880	Resistor—150 ohms, ½ watt (R10)		32847	Pointer—Dial pointer, carriage and clip	
3526	Resistor—2,200 ohms, ½ watt (R3)		32846	Rod—Pointer slide rod	
12454	Resistor—33,000 ohms, ½ watt (R2)		4393	Screw—No. 8-32 x 5/16 headless set screw for knob, Stock Nos. 32840, 32842, 32844, 33088, 33089, 33090, 33092 and 33094	

RCA Victor

Model 5X5 Series (Chassis No. RC-406)

Five-Tube, Single-Band, AC-DC Multiplex Superheterodyne Receiver

Model PLF-10

Power Line Filter Coupling Unit

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 18—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE
Receiver ..... 540-1,720 kc
Remote Control Oscillator ..... 540-800 kc

TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12C8 ..... I-F Amp., 2nd-Det., and A.V.C.
(3) RCA-12SC7 ..... 1st A-F and Remote Control Osc.
(4) RCA-35L6GT ..... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier

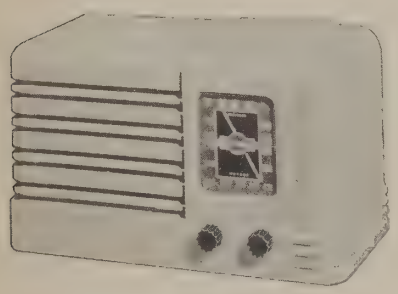
Intermediate Frequency ..... 455 kc

POWER SUPPLY RATINGS
A-C Rating ..... 100-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 100-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)
Undistorted ..... 1.5 watts
Maximum ..... 2.0 watts

LOUDSPEAKER
Type ..... 4 inch Electrodynamic
Cabinet Dimensions (inches) Height 5⅛, Width 8⅝, Depth 4⅛
Weight (net) ..... 5¼ pounds

General Description



Model 5X5I
RC-406A
Ivory Finish

Model 5X5W
RC-406
Walnut Finish

The following features are incorporated in the design of the Little Nipper Multiplex 5X5 Series Receiver:

First, it is a "standard broadcast" receiver. Second, it will operate any other radio in the home by "remote control" without the use of connecting wires. Third, records may be reproduced through the Little Nipper when used with Victrola Attachment. Fourth, the Model 5X5 (when used with Victrola Attachment) will reproduce records through any other radio in the home without the use of connecting wires.

When using the 5X5 as a remote control, the Model PLF-10 Power Line Filter Coupling Unit should be used in conjunction with the receiver to be controlled. The filter is connected between the power line receptacle and the receiver being controlled, as shown in accompanying drawing.

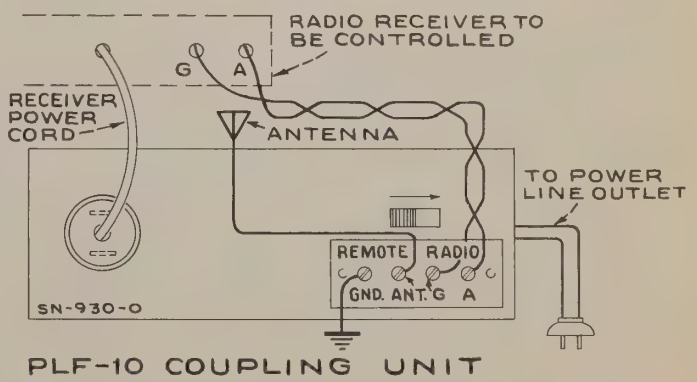
Set-up Procedure for Remote Control

1. Install the 5X5 and tune in any desired station.
2. Turn the control switch on the back of the 5X5 to its clockwise position marked "Remote." The 5X5 becomes silent.

   The 5X5 now becomes a small relay station for signalling to the controlled receiver via the power line wiring.
3. Next tune the main receiver to the exact frequency of transmission of the 5X5, usually 540 kc. Tune carefully to this frequency, setting the volume control as high as permissible with regard to hum and noise conditions. The station to which the 5X5 was tuned will be heard. If the receiver is equipped with tuning indicator (Magic Eye) the correct point will most easily be obtained by observing the indicator.
4. Now any station tuned in on the 5X5 dial will be heard on the controlled receiver. The volume will also be controlled with the 5X5 volume control.
5. If it is desired to operate the controlled receiver on its own controls it is only necessary to set the switch on the Power Line Filter Coupling Unit to its position marked "Radio."
6. In the event that, with the 5X5 being used as a remote control, other receivers in the home are in use, trouble may be experienced due to noise and hum. To avoid this, connect a Power Line Filter Coupling Unit, RCA Victor PLF-10, to each of these other receivers, as shown in accompanying drawing.

Precautionary Lead Dress

1. Dress 1st I-F plate and grid leads against chassis and away from each other. Dress plate lead from 12C8 close to chassis.
2. Dress A.V.C. condenser (0.1) close to chassis and tight to 0.25 mfd. condenser.



PLF-10 COUPLING UNIT

Antenna.—The set is equipped with length of antenna wire. Do not connect the antenna to ground. If an outdoor antenna is used, it should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Victrola Attachment.—A jack is provided on the rear of chassis for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

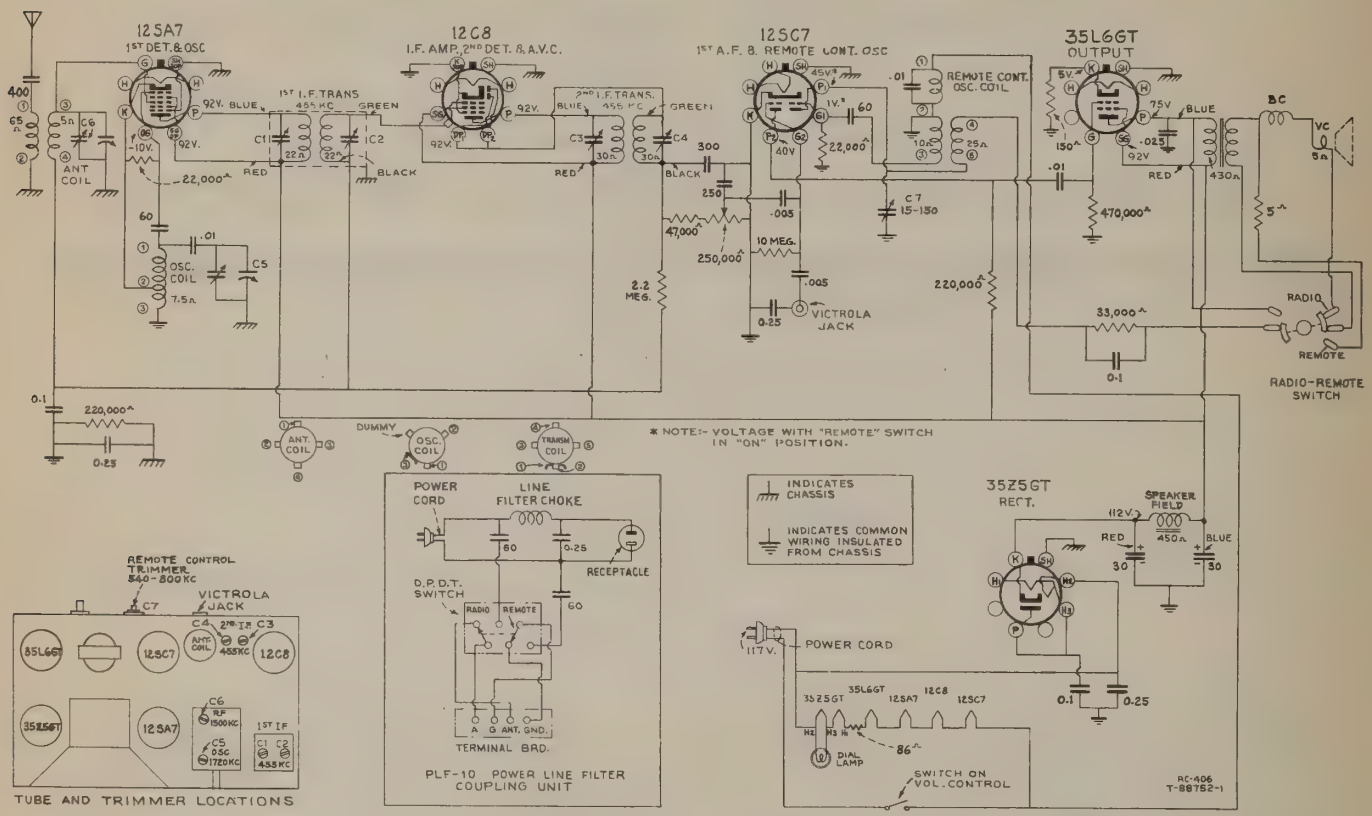
Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

The Remote Control Oscillator in the 5X5 is set at the factory to approximately 540 kc. The frequency may be varied between 540 and 800 kc to suit local conditions by adjusting the trimmer condenser C7.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

If the electric supply circuit is a three-wire system, it may be necessary to connect a ¼ mfd 700-volt capacitor between the two outside lines of the three-wire system.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Tuning condenser stator (osc.) in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna term. of ant. trans. in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C6 (antenna)



Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
13057	Capacitor—60 mmfd.
12488	Capacitor—250 mmfd.
12952	Capacitor—300 mmfd.
30433	Capacitor—400 mmfd.
4838	Capacitor—.005 mfd.
4937	Capacitor—.01 mfd.
4870	Capacitor—.025 mfd.
4839	Capacitor—0.1 mfd.
12484	Capacitor—0.25 mfd.
33321	Capacitor—Electrolytic, 2 sections 30 mfd. each
32572	Coil—Antenna coil
33320	Coil—Duplex oscillator coil
32962	Coil—Oscillator coil
33323	Condenser—Trimmer 20-150 mmfd.
32968	Condenser—2-gang variable tuning
32634	Cord—Drive cord
32946	Drum—Condenser drive drum
12409	Lead—Antenna lead
33322	Resistor—5 ohms, 5 watts
14671	Resistor—33 ohms, ½ watt
13428	Resistor—150 ohms, ½ watt
13998	Resistor—22,000 ohms, ½ watt
12454	Resistor—33,000 ohms, ½ watt
12412	Resistor—47,000 ohms, ½ watt
12264	Resistor—220,000 ohms, ½ watt
12285	Resistor—470,000 ohms, ½ watt
12679	Resistor—2.2 meg., ½ watt
13601	Resistor—10 meg., ½ watt
32945	Shaft—Tuning knob shaft and bushing

STOCK No.	DESCRIPTION
32969	Socket—Dial lamp socket
14278	Socket—Phonograph socket
32537	Socket—Tube socket
30585	Spring—Drive cord spring
33319	Transformer—First i-f transformer
32578	Volume control and power switch
	POWER LINE FILTER PLF-10
13057	Capacitor—60 mmfd.
12484	Capacitor—0.25 mfd.
33492	Coil—Choke coil
33493	Receptacle—Power receptacle
33491	Switch
	SPEAKER ASSEMBLIES (39105—2)
32964	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
X-639	Cabinet—Ivory finish—Model 5X5I (net)
X-638	Cabinet—Walnut finish—Model 5X5W (net)
32942	Dial—Glass dial scale
33317	Fastener—Push fastener to hold cabinet back
33306	Knob—Black tuning knob—Model 5X5I
32447	Knob—Ivory knob—Model 5X5W
32943	Nut—Speed nut to hold dial
31646	Spring—Knob retaining spring

RCA Victor

MODEL 6Q4X

Chassis No. RC-442

Six-Tube, Four-Band, AC-DC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U.S.A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Long Wave ("X" Band)	145-405 kc (2,069-740 m)
Standard Broadcast ("A" Band)	540-1,720 kc (555-174 m)
Medium Wave ("B" Band)	2.3-7.0 mc (130-42.8 m)
Short Wave ("C" Band)	7.0-22.0 mc (42.8-13.6 m)

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SK7 ..... R-F Amplifier
(2) RCA-6SA7 ..... 1st Detector-Oscillator
(3) RCA-6SK7 ..... I-F Amplifier
(4) RCA-6SQ7 .... 2nd Detector, A.V.C., and A-F Amplifier
(5) RCA-25L6-G ..... Output
(6) RCA-25Z6-G ..... Rectifier

PILOT LAMPS (2) ..... Mazda No. 47, 6.3 volts, .15 amp.

POWER OUTPUT RATING (125 volts, a-c)

Undistorted	1.4 watts
Maximum	2.5 watts

LOUDSPEAKER (84659-1)

Type ..... 6-inch permanent-magnet
V.C. Impedance .... 3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

105-125 volts, 40-100 cycles; or DC
160-190 volts, 40-100 cycles; or DC
210-250 volts, 40-100 cycles; or DC

POWER CONSUMPTION

105-125 volts	60 watts
210-250 volts	130 watts

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions (inches)	12½	16⅝	10 15/16
Chassis Base Dimensions (inches)	2⅞	15⅝	6½
Over-all Chassis Height (inches)			7⅞
Weight (Net lbs.)			24
Tuning Drive Ratio			10 to 1; 50 to 1

General Description

Model 6Q4X is a six-tube, four-band receiver designed for operation on a-c or d-c power supply. A universal plug-in ballast resistor permits operation on 105-125, 160-190, or 210-250 volts, by simply inserting the ballast resistor in the correct position in its socket on the chassis.

Features of design include: Radio-frequency amplifier stage on all bands; new magnetite-core i-f transformers, giving increased sensitivity and selectivity; automatic volume control; bass compensation; edge-lighted, angle-vision, straight-line dial; seven-position tone control which provides four positions for radio (including one high-fidelity position), and three positions for phonograph operation; plug-in phonograph connector; tropic-proof construction, dual-ratio tuning; and streamline plastic cabinet.

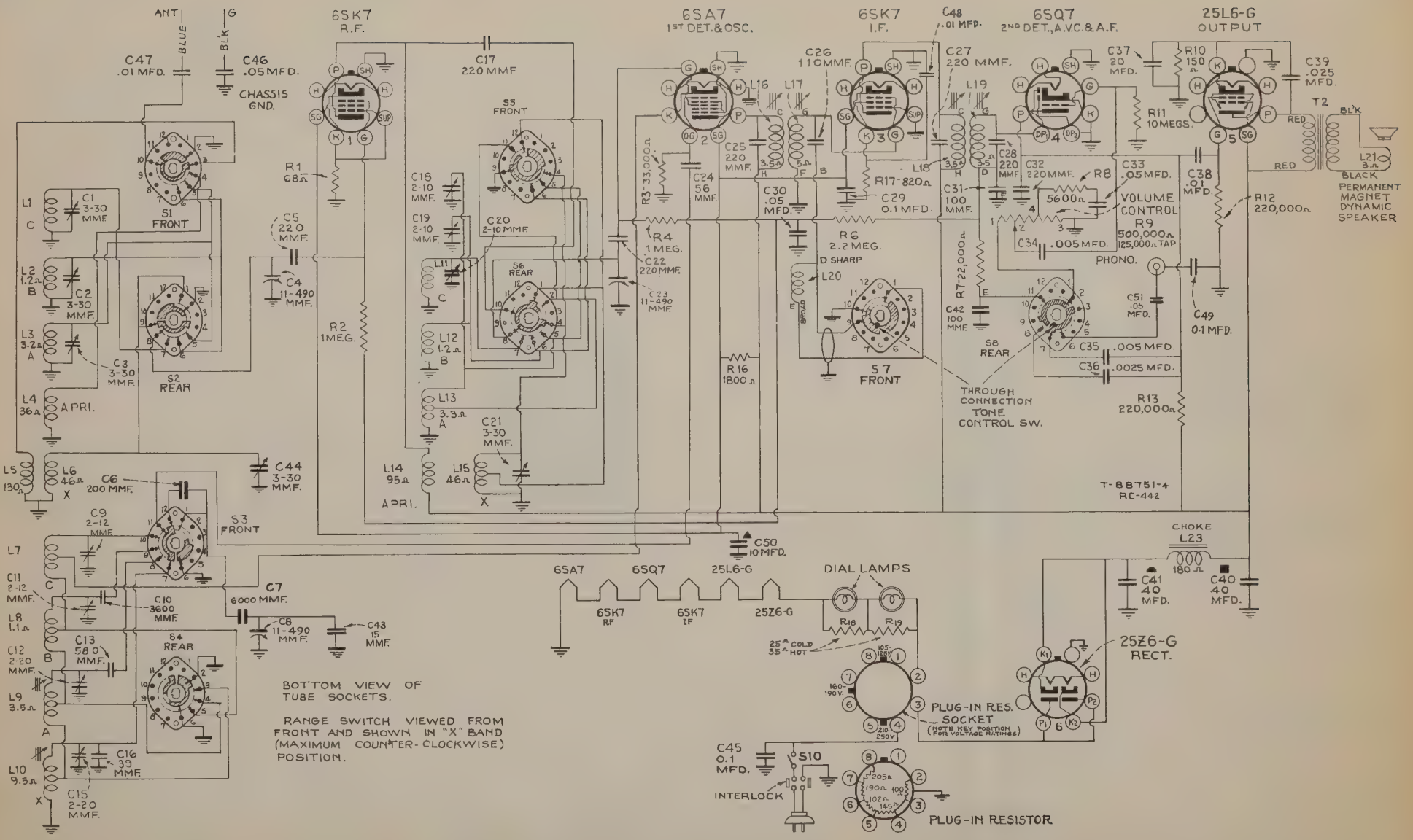
Power Supply Polarity:

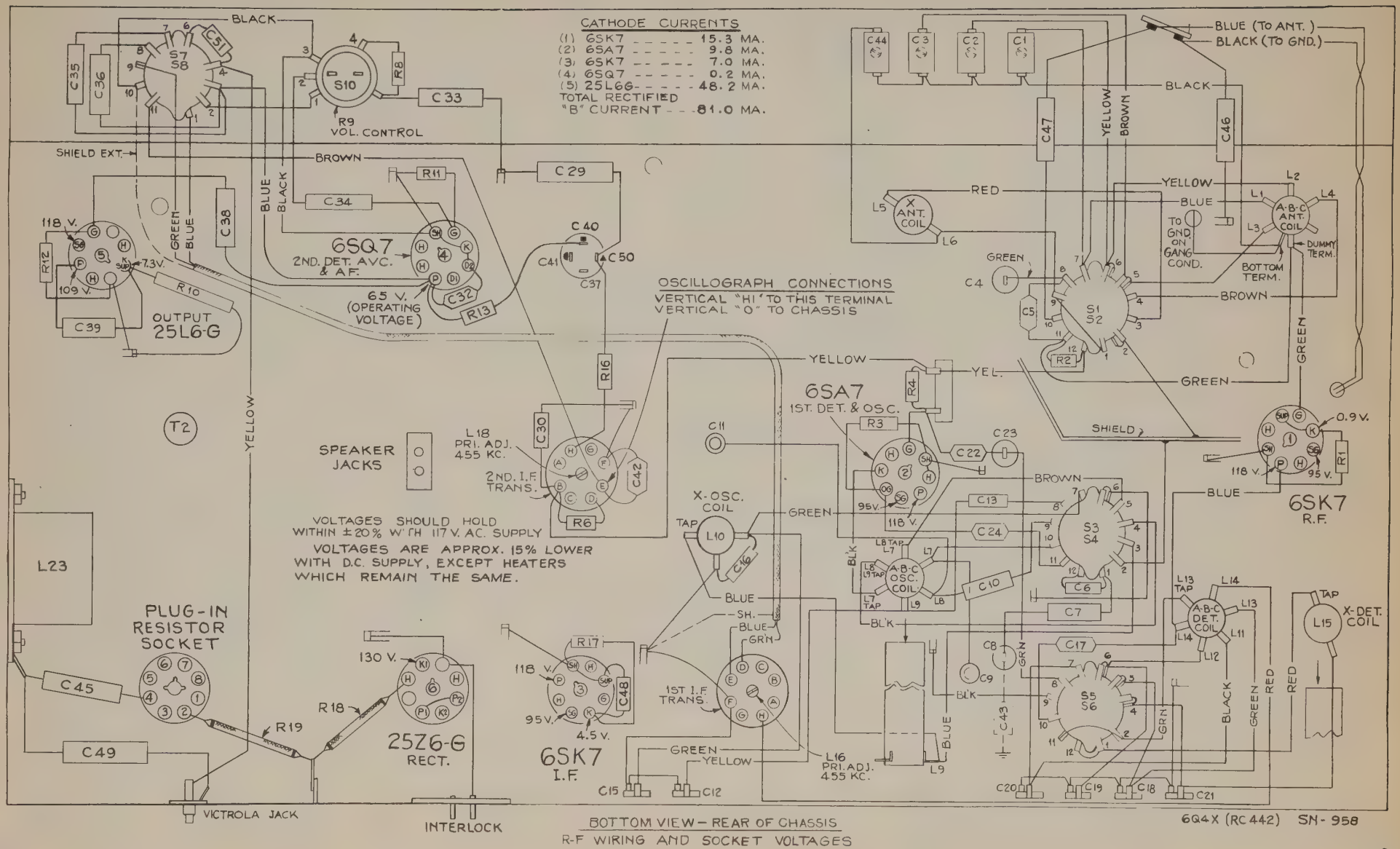
For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, a similar reversal of the plug may reduce hum.

First Edition

Trademark "Victrola" "RCA Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.


ANT
G
BLUE
BLK
C47 .01 MFD.
C46 .05 MFD.
CHASSIS GND.
6SK7 R.F.
6SA7 1ST DET. & OSC.
6SK7 I.F.
6SQ7 2ND DET., A.V.C. & A.F.
25L6-G OUTPUT
C48 .01 MFD.
C17 220 MMF
C26 110 MMF.
C27 220 MMF.
C37 20 MFD.
C39 .025 MFD.
R10 150 Ω
R11 10 MEGS.
T2
RED
BL'K
L21 3 Ω
BLACK PERMANENT MAGNET DYNAMIC SPEAKER
S5 FRONT
L16
L17
L18
L19
C25 220 MMF.
C28 220 MMF
C32 220 MMF.
R8
C33 .05 MFD.
C38 .01 MFD.
R12 220,000 Ω
VOLUME CONTROL R9 500,000 Ω 125,000 Ω TAP
PHONO.
C34 .005 MFD.
C51 .05 MFD.
C49 0.1 MFD.
R1 68 Ω
C5 220 MMF.
C4 11-490 MMF.
R2 1 MEG.
C18 2-10 MMF.
C19 2-10 MMF.
C20 2-10 MMF.
S6 REAR
L11
L12 1.2 Ω B
L13 3.3 Ω A
C21 3-30 MMF.
L14 95 Ω
L15 46 Ω
APRI.
X
R3 33,000 Ω
C24 56 MMF.
C30 .05 MFD.
R4 1 MEG.
C22 220 MMF.
C23 11-490 MMF.
R6 2.2 MEG.
D SHARP
L20
BROAD
R7 22,000 Ω
C42 100 MMF
R16 1800 Ω
S7 FRONT
S8 REAR
C35 .005 MFD.
C36 .0025 MFD.
THROUGH CONNECTION TONE CONTROL SW.
R13 220,000 Ω
T-88751-4
RC-442
L1 C
C1 3-30 MMF.
S1 FRONT
L2 1.2 Ω B
C2 3-30 MMF.
L3 3.2 Ω A
C3 3-30 MMF.
S2 REAR
L4 36 Ω A PRI.
L5 130 Ω
L6 46 Ω X
C6 200 MMF.
C44 3-30 MMF.
S3 FRONT
C9 2-12 MMF.
L7
C11 2-12 MMF.
C10 3600 MMF.
C7 6000 MMF.
C8 11-490 MMF.
C43 15 MMF.
L8 1.1 Ω
C12 2-20 MMF.
C13 580 MMF.
S4 REAR
L9 3.5 Ω
C16 39 MMF.
L10 9.5 Ω
C15 2-20 MMF.
C50 10 MFD.
CHOKE L23
180 Ω
C41 40 MFD.
C40 40 MFD.
6SA7 6SQ7 25L6-G
6SK7 RF 6SK7 IF 25Z6-G
DIAL LAMPS
R18
R19
25 Ω COLD 35 Ω HOT
105-125V
160-190V
200-250V
PLUG-IN RES. SOCKET
(NOTE KEY POSITION FOR VOLTAGE RATINGS)
25Z6-G RECT.
C45 0.1 MFD.
S10
INTERLOCK
205 Ω
190 Ω
102 Ω
100 Ω
14.5 Ω
PLUG-IN RESISTOR
BOTTOM VIEW OF TUBE SOCKETS.
RANGE SWITCH VIEWED FROM FRONT AND SHOWN IN "X" BAND (MAXIMUM COUNTER-CLOCKWISE) POSITION.


CATHODE CURRENTS
(1) 6SK7 - - - - - - 15.3 MA.
(2) 6SA7 - - - - - - 9.8 MA.
(3) 6SK7 - - - - - - 7.0 MA.
(4) 6SQ7 - - - - - - 0.2 MA.
(5) 25L66- - - - - - 48.2 MA.
TOTAL RECTIFIED "B" CURRENT - - 81.0 MA.
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL
VERTICAL "O" TO CHASSIS
VOLTAGES SHOULD HOLD WITHIN ±20% WITH 117 V. AC. SUPPLY
VOLTAGES ARE APPROX. 15% LOWER WITH D.C. SUPPLY, EXCEPT HEATERS WHICH REMAIN THE SAME.
6SQ7 2ND. DET. AVC. & A.F.
6SA7 1ST. DET. & OSC.
6SK7 R.F.
6SK7 I.F.
25L6-G OUTPUT
25Z6-G RECT.
R9 VOL. CONTROL
SPEAKER JACKS
L18 PRI. ADJ. 455 KC.
2ND. I.F. TRANS.
X-OSC. COIL
1ST. I.F. TRANS.
L16 PRI. ADJ. 455 KC.
PLUG-IN RESISTOR SOCKET
VICTROLA JACK
INTERLOCK
X ANT. COIL
A-B-C ANT. COIL
A-B-C OSC. COIL
A-B-C DET. COIL
X-DET. COIL
BOTTOM TERM.
DUMMY TERM.
TO GND ON GANG COND.
BLUE (TO ANT.)
BLACK (TO GND.)
65 V. (OPERATING VOLTAGE)
118 V.
109 V.
7.3 V.
130 V.
95 V.
4.5 V.
0.9 V.
BOTTOM VIEW — REAR OF CHASSIS
R-F WIRING AND SOCKET VOLTAGES
6Q4X (RC 442) SN-958

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the black lead and keep the output as low as possible to avoid a-v-c action.

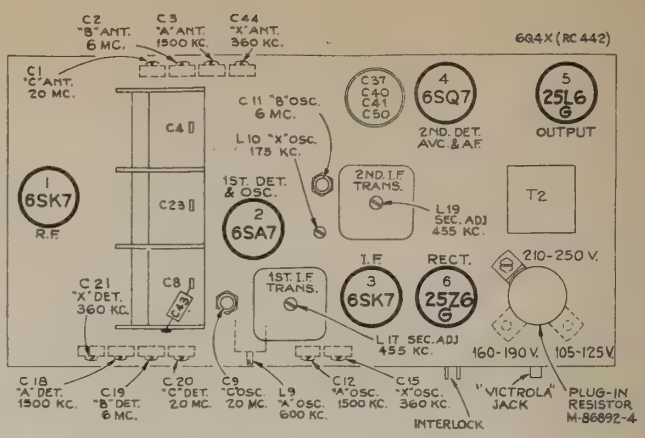
Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

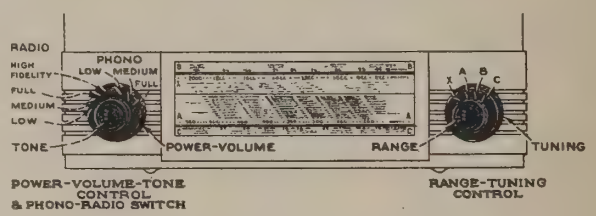
As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 180° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed.

For additional details, refer to booklet "RCA Victor Receiver Alignment."





Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Turn tone control to 3rd position (sharp) from maximum counter-clockwise.			
2	6SK7 I-F grid in series with .01 mfd.	455 kc	"A" Band Quiet point between 550-750 kc	L18 and L19 (2nd I-F trans.)
3	6SA7 grid in series with .01 mfd.			L16 and L17 (1st I-F trans.)
4	Turn tone control to 4th position (broad) from maximum counter-clockwise and check I-F response which should be a slightly double-peaked curve. Leave tone control in 3rd position (sharp) for the following steps.			
5	Ant. terminal in series with 200 mmfd.	360 kc	360 kc (31.5°) "X" Band	C15 (osc.)† C21 (det.) C44 (ant.)
6		175 kc	175 kc (127.2°) "X" Band	L10 (osc.) Rock gang
7		1,500 kc	1,500 kc (28°) "A" Band	C12 (osc.)†† C18 (det.) C3 (ant.)
8		600 kc	600 kc (148°) "A" Band	L9 (osc.) Rock gang
9	Repeat steps 5, 6, 7, and 8.			
10	Ant. terminal in series with 300 ohms	6 mc	6 mc (30°) "B" Band	C11 (osc.)* C19 (det.) C2 (ant.)
11		20 mc	20 mc (23°) "C" Band	C9 (osc.)** C20 (det.) C1 (ant.)

* Use **minimum** capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

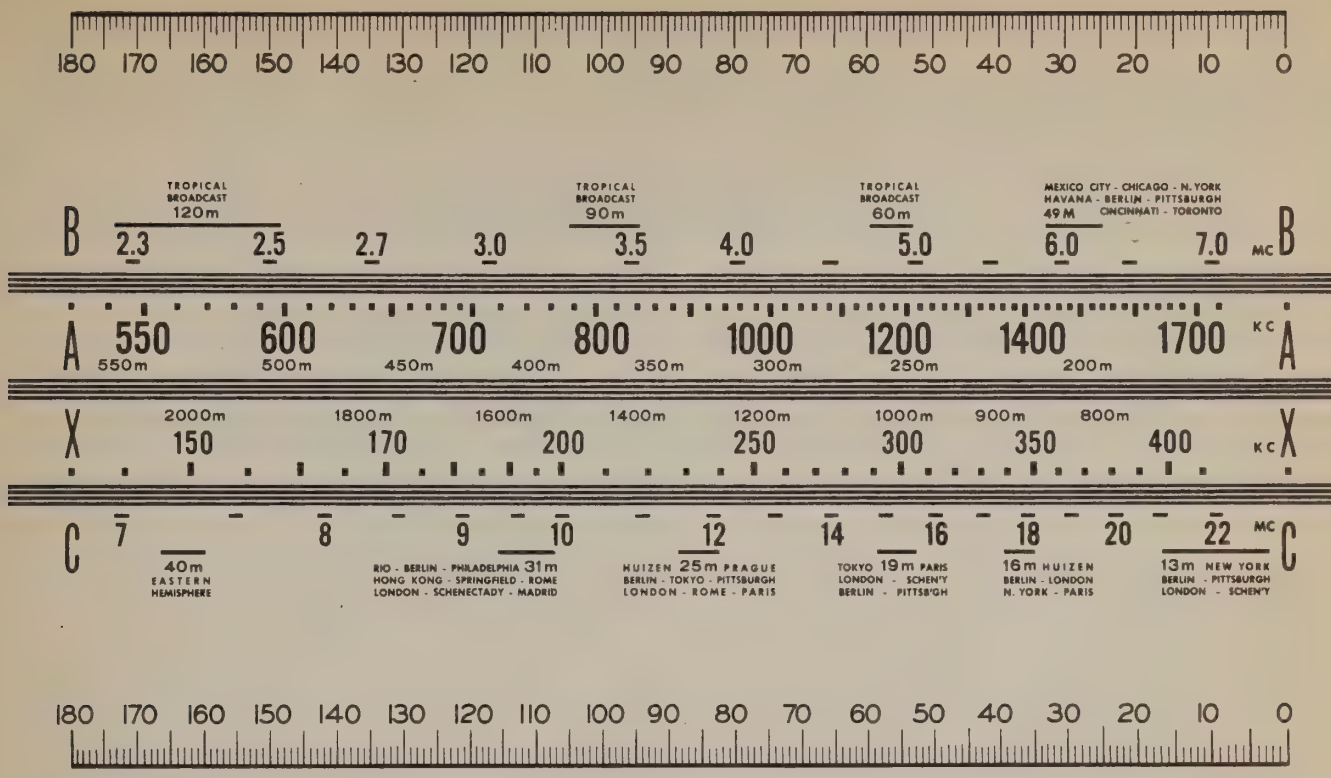
** Use **minimum** capacity peak if two can be obtained. Check to determine that C9 has been adjusted to the correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

† Preset L10 core approximately ½-inch out before adjusting C15.

†† Preset L9 core screw flush with apron before adjusting C12.

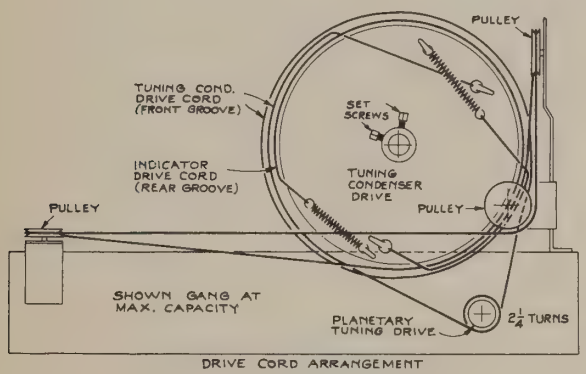
Note.—Oscillator tracks **above** signal on all bands.

Calibration Scale

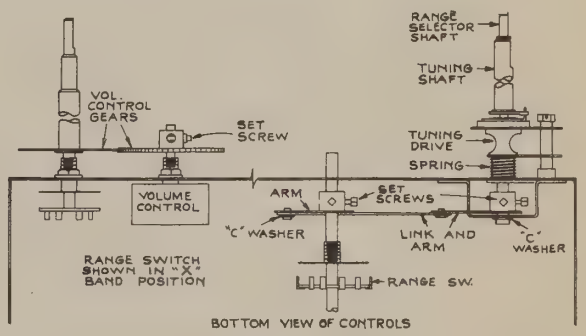

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
B
TROPICAL BROADCAST 120m
2.3 2.5 2.7 3.0
TROPICAL BROADCAST 90m
3.5 4.0
TROPICAL BROADCAST 60m
5.0
MEXICO CITY - CHICAGO - N. YORK HAVANA - BERLIN - PITTSBURGH 49 M CINCINNATI - TORONTO
6.0 7.0 MC
A
550 600 700 800 1000 1200 1400 1700 KC
550m 500m 450m 400m 350m 300m 250m 200m
X
2000m 1800m 1600m 1400m 1200m 1000m 900m 800m
150 170 200 250 300 350 400 KC
C
7 8 9 10 12 14 16 18 20 22 MC
40m EASTERN HEMISPHERE
RIO - BERLIN - PHILADELPHIA 31m HONG KONG - SPRINGFIELD - ROME LONDON - SCHENECTADY - MADRID
HUIZEN 25m PRAGUE BERLIN - TOKYO - PITTSBURGH LONDON - ROME - PARIS
TOKYO 19m PARIS LONDON - SCHEN'Y BERLIN - PITTSB'GH
16m HUIZEN BERLIN - LONDON N. YORK - PARIS
13m NEW YORK BERLIN - PITTSBURGH LONDON - SCHEN'Y
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 28° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."



DRIVE CORD ARRANGEMENT

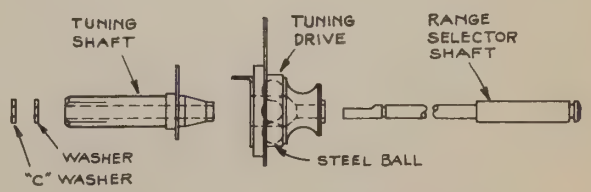


BOTTOM VIEW OF CONTROLS

Phonograph Operation:

A jack is provided on the rear of the chassis for connection to a Victrola Attachment. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.

The attachment must be designed to operate on the particular voltage and frequency of the power supply line. (Most attachments are for alternating current only, and can not be used on direct current.)



PLANETARY TUNING DRIVE ASS'Y

Precautionary Lead Dress:

1. Dress black lead from L11 to C20 against terminals 6 and 7 of S6.
2. Dress the green lead from the middle section of the gang away from any other leads, parts, or chassis.
3. Dress the black diode lead running between the 6SQ7 and terminal G on the 2nd I-F transformer, directly against the chassis.
4. Twist the power leads together and dress them away from the 6SQ7 socket.
5. Dress the brown lead from terminal E on the 2nd I-F transformer to terminal 11 on S8 against the chassis.
6. Dress the black lead from trimmer (C1) to antenna coil away from the range switch link action.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily indentified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-442)
10194	Ball—Steel ball
33947	Ballast—Ballast resistor tube—Type 86892-4
12896	Capacitor—15 mmfd. (C43)
13545	Capacitor—39 mmfd. (C16)
12723	Capacitor—56 mmfd. (C24)
12720	Capacitor—100 mmfd. (C31, C42)
32239	Capacitor—110 mmfd. (C26)
30232	Capacitor—200 mmfd. (C6)
12694	Capacitor—220 mmfd. (C5, C17, C22, C32)
33760	Capacitor—220 mmfd. (C25, C27, C28)
33235	Capacitor—580 mmfd. (C13)
12811	Capacitor—3,600 mmfd. (C10)
31405	Capacitor—6,000 mmfd. (C7)
33818	Capacitor—Trimmer capacitor—2 sections of 2-20 mmfd. each (C12, C15)
33822	Capacitor—Trimmer capacitor—4 sections of 3-30 mmfd. each (C1, C2, C3, C44)
33821	Capacitor—Trimmer capacitor—4 sections, of 3 2-10 mmfd. each and 1 of 3-30 mmfd. (C18, C19, C20, C21)
5107	Capacitor—.0025 mfd. (C36)
33584	Capacitor—.005 mfd. (C34, C35)
4937	Capacitor—.01 mfd. (C38, C47, C48)
4870	Capacitor—.025 mfd. (C39)
32787	Capacitor—.05 mfd. (C30, C33, C46, C51)
4839	Capacitor—0.1 mfd. (C29, C45, C49)
12714	Capacitor—Trimmer capacitor—2-12 mfd. (C9, C11)
33824	Capacitor—Comprising 2 sections of 40 mfd., 1 of 10 mfd. and 1 of 20 mfd. (C37, C40, C41, C50)
33762	Coil—Antenna coil—A-B-C bands (L1, L2, L3, L4)
32823	Coil—Antenna coil—X band (L5, L6)
33764	Coil—Oscillator coil—A-B-C bands (L7, L8, L9)
32931	Coil—Oscillator coil—X band (L10)
33763	Coil—Detector coil—A-B-C bands (L11, L12, L13, L14)
33765	Coil—Detector coil—X band (L15)
33756	Condenser—Variable tuning condenser (C4, C8, C23)
33951	Control—Volume control and power switch (R9, S10)
32634	Cord—Variable tuning condenser drive cord
32635	Cord—Indicator drive cord
32713	Core—Core and stud assembly for oscillator coils
33770	Drive—Planetary tuning drive complete, less shafts
33773	Drum—Variable tuning condenser drum
33185	Gear—Gear and hub for volume control and power switch
33768	Gear—Shaft and gear for tone control
31480	Lamp—Pilot lamp
33767	Link—Operating link between knob, shaft and range switch
33825	Plug—2-prong male plug for power input
32709	Reactor—Filter reactor (L23)
33947	Resistor—Ballast resistor tube—Type 86892-4
33953	Resistor—Flexible resistor (R18, R19)
14281	Resistor—68 ohms, ½ watt (R1)
30880	Resistor—150 ohms, ½ watt (R10)
14076	Resistor—820 ohms, ½ watt (R17)
12194	Resistor—1,800 ohms, ½ watt (R16)
13714	Resistor—5,600 ohms, ½ watt (R8)
14284	Resistor—22,000 ohms, 1/10 watt (R7)
12454	Resistor—33,000 ohms, ½ watt (R3)
12264	Resistor—220,000 ohms, ½ watt (R12, R13)
13730	Resistor—1 megohm, ½ watt (R2, R4)
12679	Resistor—2.2 megohm, ½ watt (R6)
13601	Resistor—10 megohm, ½ watt (R11)
33180	Retainer—Planetary drive retaining ring
33771	Shaft—Tuning knob shaft
33772	Shaft—Range switch shaft
31365	Socket—Lamp socket
33742	Socket—Phonograph input socket
30956	Socket—Speaker socket
31251	Socket—Tube socket
13638	Spring—Indicator drive cord spring
33769	Spring—Planetary tuning drive spring
33758	Switch—Range switch (S1, S2, S3, S4, S5, S6)
33816	Switch—Tone control, and phono. switch (S7, S8)
33759	Transformer—First i-f transformer (L16, L17, C25, C26)
33761	Transformer—Second i-f transformer (L18, L19, C27, C28, C31, R7)
33826	Transformer—Output transformer (T2)
33947	Tube—Ballast resistor tube—Type 86892-4
	SPEAKER ASSEMBLIES (84659-1)
33962	Cone—Cone, voice coil and center suspension assembled in metal housing (L21)
33828	Speaker—Speaker complete
	MISCELLANEOUS ASSEMBLIES
32836	Cord—Power cord complete with male and female connectors
34296	Dial—Glass dial scale (English)
34503	Dial—Glass dial scale (Arabic)
33797	Frame—Dial frame assembly complete, less dial.
34136	Knob—Tuning or volume control knob
34570	Knob—Tone control knob
34571	Knob—Range switch knob
33774	Mounting—Speaker hardware mounting
4982	Spring—Retaining spring for knob, Stock No. 34136
14270	Spring—Retaining spring for knob, Stock No. 34570
34138	Spring—Retaining spring for knob, Stock No. 34571

RCA Victor

Model 7Q4X (Chassis No. RC-502)

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

"X" Band	145-405 kc (2,069-740 m)
Standard Broadcast ("A")	540-1,720 kc (555-174 m)
"B" Band	2.3-7.0 mc (130-42.8 m)
"C" Band	7.0-22.0 mc (42.8-13.6 m)
INTERMEDIATE FREQUENCY	455 kc

RCA TUBE COMPLEMENT

(1) RCA-12SK7	R-F Amplifier
(2) RCA-12SA7	1st Detector, Oscillator
(3) RCA-12SK7	I-F Amplifier
(4) RCA-12SQ7	2nd Detector, A.V.C., Audio Amplifier
(5) RCA-50L6GT	Output
(6) RCA-35Z5GT	Rectifier
(7) RCA-6N5	Tuning Indicator

LOUDSPEAKER (RL-90-1)

Type	8-inch permanent magnet dynamic
Voice Coil Impedance	2.6 ohms at 400 cycles

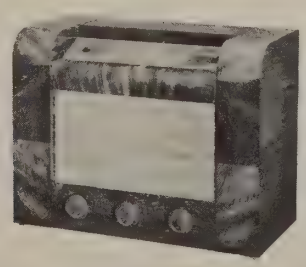
POWER OUTPUT RATING

Undistorted	3.5 watts
Maximum	4.5 watts

Pilot Lamps (3) ..... Mazda No. 47, 6.3 volts, .15 amp.

POWER SUPPLY RATINGS

160-200 volts, 40-100 cycles	60 watts
160-200 volts, Direct Current	60 watts
210-250 volts, 40-100 cycles	70 watts
210-250 volts, Direct Current	70 watts



Mechanical Specifications

Height	15 9/16 inches
Width	20 5/8 inches
Depth	9 7/8 inches
Net weight	31 pounds
Chassis dimensions, inches	15 1/2 x 6 1/2 x 2 7/8
Overall chassis height	11 1/2 inches
Tuning Drive Ratio	36 to 1

Phonograph Operation:

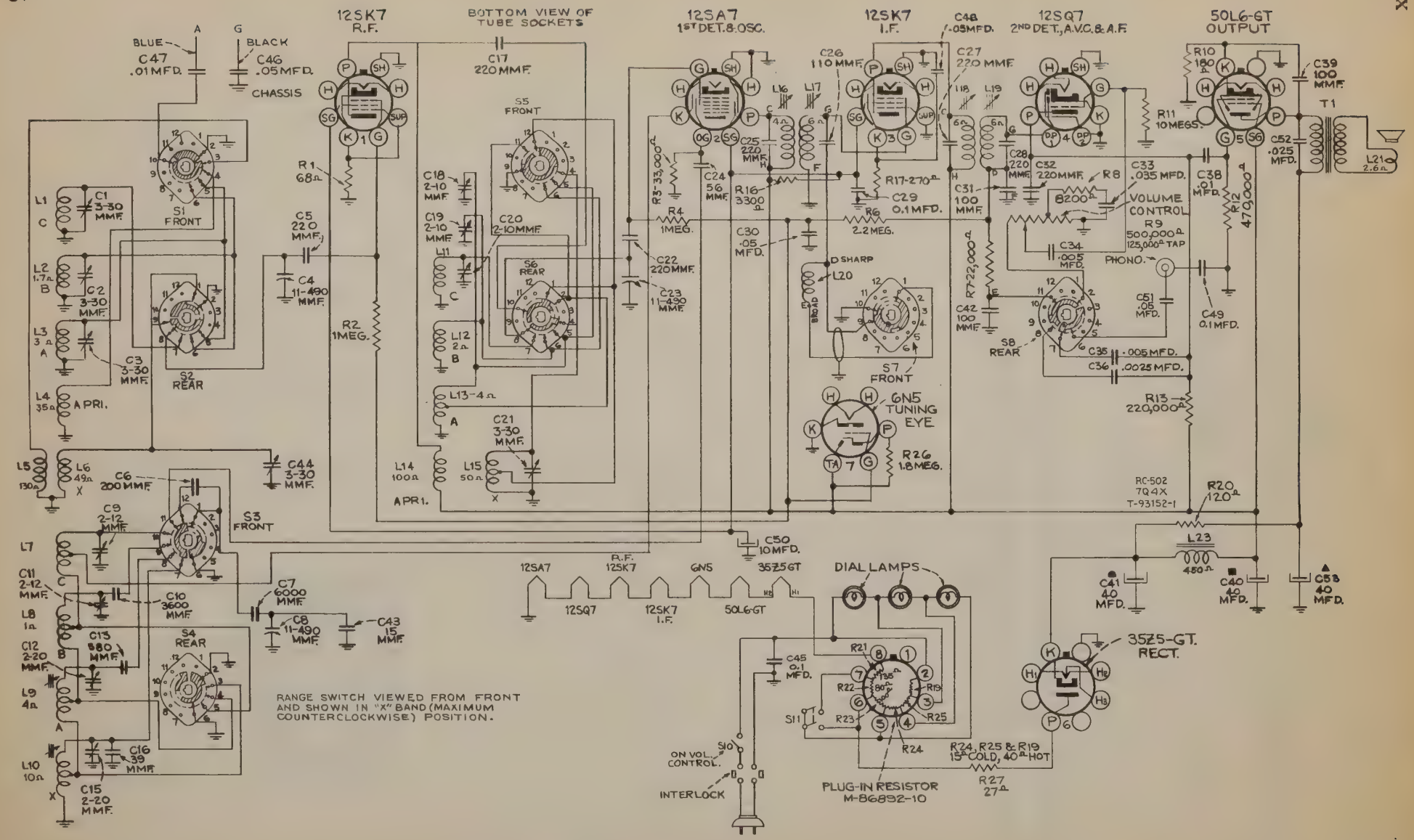
A jack is provided on the rear of the chassis for connection to a phonograph attachment. The cable from the phonograph attachment should be terminated in a Stock No. 31048 plug to fit the jack.

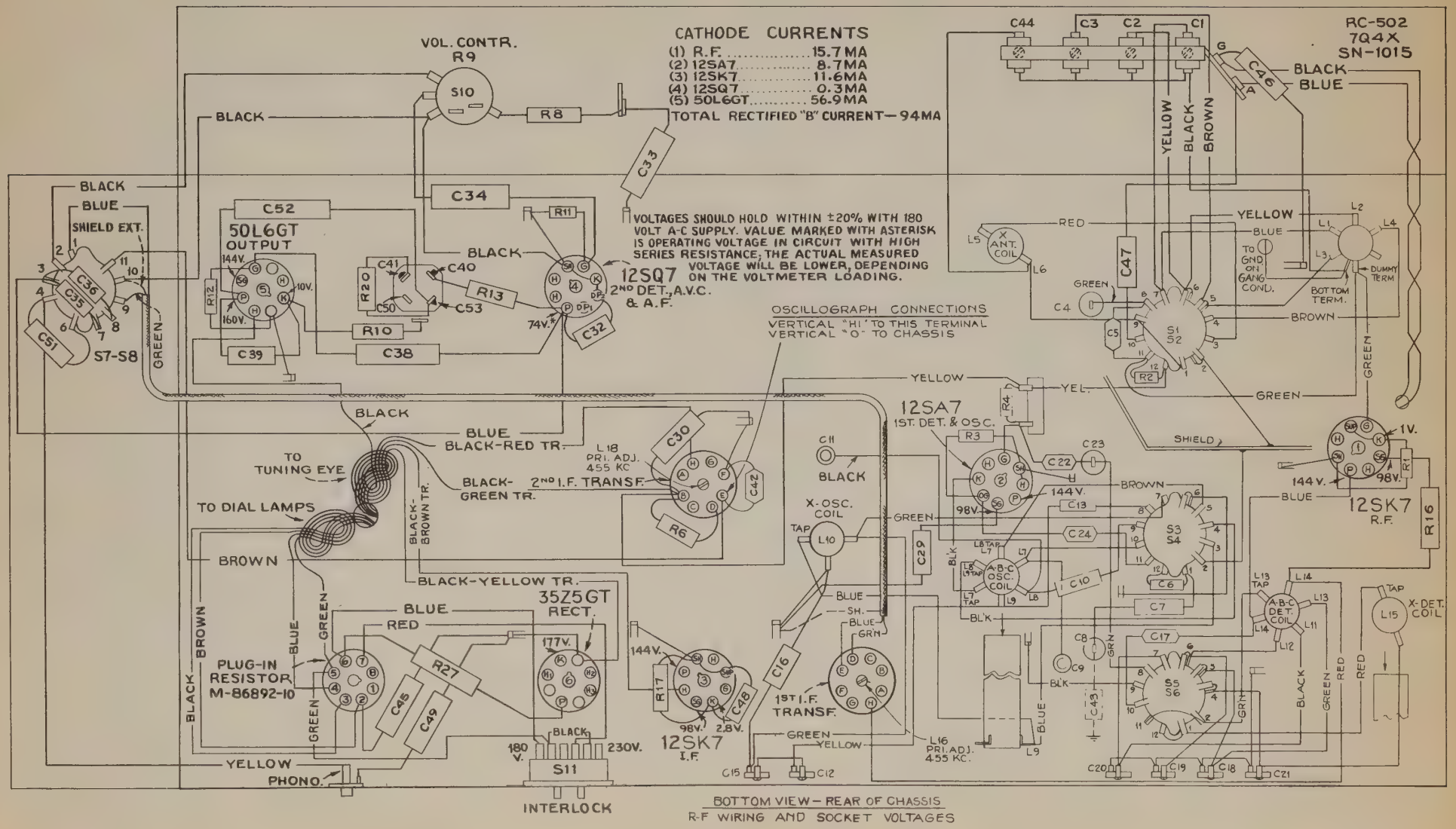
The attachment must be designed to operate on the particular voltage and frequency of the power supply line. (Most attachments are for alternating current only, and can not be used on direct current.)

Trademarks "RCA Victor," "Magic Eye," "Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

First Edition

Printed in U. S. A.


12SK7 R.F.
BOTTOM VIEW OF TUBE SOCKETS
12SA7 1ST DET. & OSC.
12SK7 I.F.
12SQ7 2ND DET., A.V.C. & A.F.
50L6-GT OUTPUT
BLUE
BLACK
C47 .01 MFD.
C46 .05 MFD.
CHASSIS
C17 220 MMF.
S5 FRONT
S1 FRONT
S2 REAR
S6 REAR
S3 FRONT
S4 REAR
S7 FRONT
S8 REAR
C1 3-30 MMF.
C2 3-30 MMF.
C3 3-30 MMF.
C4 11-490 MMF.
C5 220 MMF.
C6 200 MMF.
C7 6000 MMF.
C8 11-490 MMF.
C9 2-12 MMF.
C10 3600 MMF.
C11 2-12 MMF.
C12 2-20 MMF.
C13 880 MMF.
C15 2-20 MMF.
C16 39 MMF.
C18 2-10 MMF.
C19 2-10 MMF.
C20 2-10 MMF.
C21 3-30 MMF.
C22 220 MMF.
C23 11-490 MMF.
C24 56 MMF.
C25 220 MMF.
C26 110 MMF.
C27 220 MMF.
C28 220 MMF.
C29 0.1 MFD.
C30 .05 MFD.
C31 100 MMF.
C32 220 MMF.
C33 .035 MFD.
C34 .005 MFD.
C35 .005 MFD.
C36 .0025 MFD.
C38 .01 MFD.
C39 100 MMF.
C40 40 MFD.
C41 40 MFD.
C42 100 MMF.
C43 15 MMF.
C44 3-30 MMF.
C45 0.1 MFD.
C48 .05 MFD.
C49 0.1 MFD.
C50 10 MFD.
C51 .05 MFD.
C52 .025 MFD.
C53 40 MFD.
R1 68Ω
R2 1MEG.
R3 33,000Ω
R4 1MEG.
R5 2.2 MEG.
R8 B200Ω
R9 500,000Ω 125,000Ω TAP
R10 180Ω
R11 10 MEGS.
R13 220,000Ω
R16 3300Ω
R17 270Ω
R20 120Ω
R21
R22
R23
R24
R25
R26 1.8 MEG.
R27 27Ω
VOLUME CONTROL
PHONO.
6N5 TUNING EYE
L1 C
L2 1.7Ω B
L3 3Ω A
L4 35Ω APRI.
L5 130Ω
L6 49Ω X
L7 C
L8 1Ω
L9 4Ω A
L10 10Ω X
L11 C
L12 2Ω B
L13 4Ω A
L14 100Ω APRI.
L15 50Ω X
L17
L19
L20
L21 2.6Ω
L23 450Ω
T1
RC-502 7Q4X T-93152-1
12SA7 R.F. 12SK7 6N5 35Z5GT
12SQ7 12SK7 I.F. 50L6-GT
DIAL LAMPS
35Z5-GT. RECT.
S10 ON VOL. CONTROL
S11
INTERLOCK
PLUG-IN RESISTOR M-86892-10
R24, R25 & R19 15Ω COLD, 40Ω HOT
RANGE SWITCH VIEWED FROM FRONT AND SHOWN IN "X" BAND (MAXIMUM COUNTERCLOCKWISE) POSITION.


CATHODE CURRENTS
(1) R.F. ..... 15.7 MA
(2) 12SA7 ..... 8.7 MA
(3) 12SK7 ..... 11.6 MA
(4) 12SQ7 ..... 0.3 MA
(5) 50L6GT ..... 56.9 MA
TOTAL RECTIFIED "B" CURRENT — 94 MA
RC-502
7Q4X
SN-1015
VOL. CONTR. R9
S10
R8
C33
C34
C52
50L6GT OUTPUT
144V.
160V.
10V.
74V.
R11
R12
R20
R13
C41
C40
C50
C53
C39
R10
C38
C32
12SQ7 2ND DET., A.V.C. & A.F.
VOLTAGES SHOULD HOLD WITHIN ±20% WITH 180 VOLT A-C SUPPLY. VALUE MARKED WITH ASTERISK IS OPERATING VOLTAGE IN CIRCUIT WITH HIGH SERIES RESISTANCE; THE ACTUAL MEASURED VOLTAGE WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL
VERTICAL "O" TO CHASSIS
SHIELD EXT.
C36
C35
C51
S7-S8
GREEN
BLACK
BLUE
BLACK-RED TR.
BLACK-GREEN TR.
BLACK-BROWN TR.
BLACK-YELLOW TR.
TO TUNING EYE
TO DIAL LAMPS
L18 PRI. ADJ. 455 KC
C30
C42
R6
2ND I.F. TRANSF.
C11
X-OSC. COIL
L10
TAP
C29
12SA7 1ST. DET. & OSC.
R3
C22
C23
R4
C13
C24
C10
C6
C7
C8
C9
C17
S3 S4 S5 S6
A-B-C OSC. COIL
A-B-C DET. COIL
L13 TAP
L14
L11
L12
L15
X-DET. COIL
TAP
1V.
144V.
98V.
12SK7 R.F.
R16
R1
C44
C3
C2
C1
C46
G
A
YELLOW
BLACK
BROWN
L5
ANT. COIL
L6
C47
RED
C4
GREEN
C5
S1 S2
R2
L1
L2
L3
L4
TO GND. OF GANG COND.
BOTTOM TERM.
DUMMY TERM
BROWN
GREEN
YEL.
SHIELD
BLUE
BLK
GRN
SH.
BLUE
GRN
BLACK
BROWN
GREEN
BLUE
RED
YELLOW
PLUG-IN RESISTOR M-86892-10
R27
C45
C49
35Z5GT RECT.
177V.
180 V.
230V.
S11
INTERLOCK
PHONO.
1ST I.F. TRANSF.
C16
144V.
R17
C48
98V.
2.8V.
12SK7 I.F.
C15
C12
L16 PRI. ADJ. 455 KC.
L9
C43
C20
C19
C18
C21
BOTTOM VIEW — REAR OF CHASSIS
R-F WIRING AND SOCKET VOLTAGES

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment. — If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator. — For all alignment operations, connect the low side of the test-oscillator to the black lead and keep the output as low as possible to avoid a-v-c action.

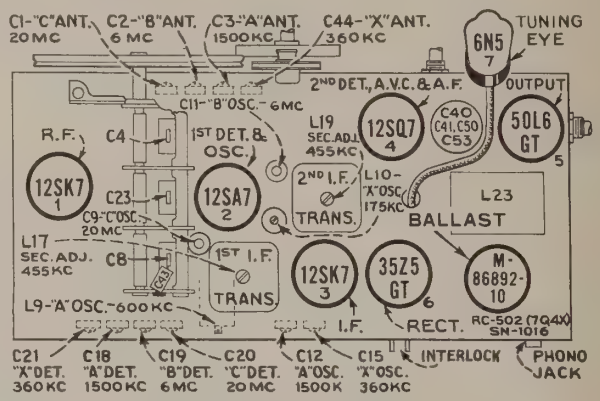
Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 0° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed.

For additional details, refer to booklet "RCA Victor Receiver Alignment."



Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Turn tone control to 3rd position (sharp) from maximum counter-clockwise.			
2	12SK7 I-F grid in series with .01 mfd.	455 kc	"A" band Quiet point between 550-750 kc	L18 and L19 (2nd I-F trans.)
3	12SA7 grid in series with .01 mfd.			L16 and L17 (1st I-F trans.)
4	Turn tone control to 4th position (broad) from maximum counter-clockwise and check I-F response which should be a slightly double-peaked curve. Leave tone control in 3rd position (sharp) for the following steps.			
5	Ant. lead in series with 200 mmfd.	360 kc	360 kc (149°) "X" band	C15 (osc.)† C21 (det.) C44 (ant.)
6		175 kc	175 kc (53°) "X" band	L10 (osc.) Rock gang
7		1,500 kc	1,500 kc (152°) "A" band	C12 (osc.)†† C18 (det.) C3 (ant.)
8		600 kc	600 kc (32°) "A" band	L9 (osc.) Rock gang
9	Repeat steps 5, 6, 7, and 8.			
10	Ant. lead in series with 300 ohms	6 mc	6 mc (149°) "B" band	C11 (osc.)* C19 (det.) C2 (ant.)
11		20 mc	20 mc (157°) "C" band	C9 (osc.)** C20 (det.) C1 (ant.)

* Use **minimum** capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

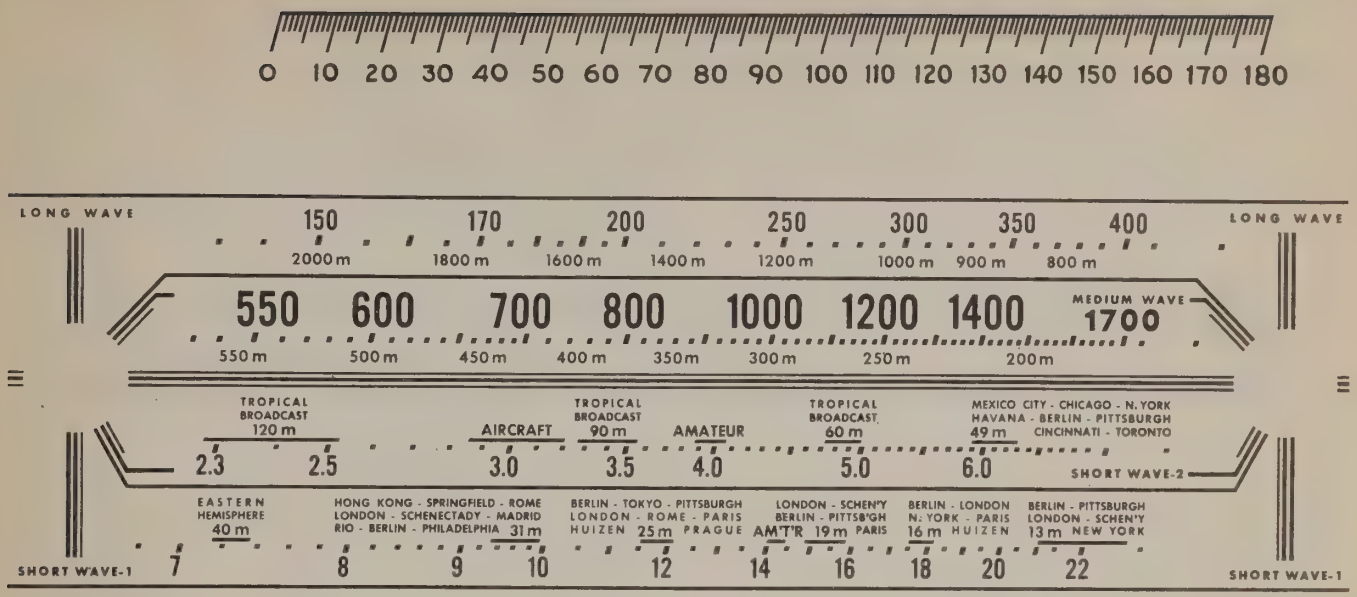
** Use **minimum** capacity peak if two can be obtained. Check to determine that C9 has been adjusted to the correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

† Preset L10 core approximately ½-inch out before adjusting C15.

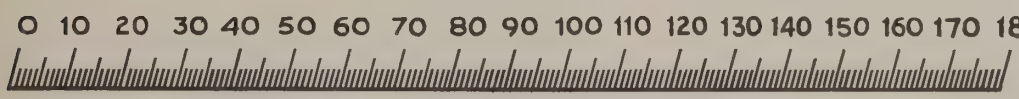
†† Preset L9 core screw flush with apron before adjusting C12.

Note.—Oscillator tracks above signal on all bands.

Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
LONG WAVE
150 170 200 250 300 350 400
2000m 1800m 1600m 1400m 1200m 1000m 900m 800m
550 600 700 800 1000 1200 1400 1700
MEDIUM WAVE
550m 500m 450m 400m 350m 300m 250m 200m
TROPICAL BROADCAST 120 m
AIRCRAFT
TROPICAL BROADCAST 90 m
AMATEUR
TROPICAL BROADCAST 60 m
MEXICO CITY - CHICAGO - N. YORK
HAVANA - BERLIN - PITTSBURGH
CINCINNATI - TORONTO
49 m
2.3 2.5 3.0 3.5 4.0 5.0 6.0
SHORT WAVE-2
EASTERN HEMISPHERE 40 m
HONG KONG - SPRINGFIELD - ROME
LONDON - SCHENECTADY - MADRID
RIO - BERLIN - PHILADELPHIA 31 m
BERLIN - TOKYO - PITTSBURGH
LONDON - ROME - PARIS
HUIZEN 25m PRAGUE
LONDON - SCHEN'Y
BERLIN - PITTSB'GH
AM'T'R 19m PARIS
BERLIN - LONDON
N. YORK - PARIS
16 m HUIZEN
BERLIN - PITTSBURGH
LONDON - SCHEN'Y
13 m NEW YORK
SHORT WAVE-1
7 8 9 10 12 14 16 18 20 22
SHORT WAVE-1

27884



Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 152° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."

Precautionary Lead Dress:

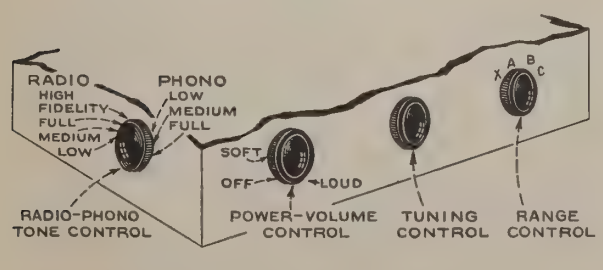
1. Dress the black diode lead running between the 12SQ7 and terminal G on the 2nd I-F transformer, directly against the chassis.

2. Dress the brown lead from terminal E on the 2nd I-F transformer to terminal 11 on S8 against the chassis.

3. Dress the phono lead from phono jack to switch along the side of the chassis.

4. Dress the filament lead from No. 8 of the 12SQ7 to 12SK7 R.F. behind the 12SQ7 socket and away from diode and plate.

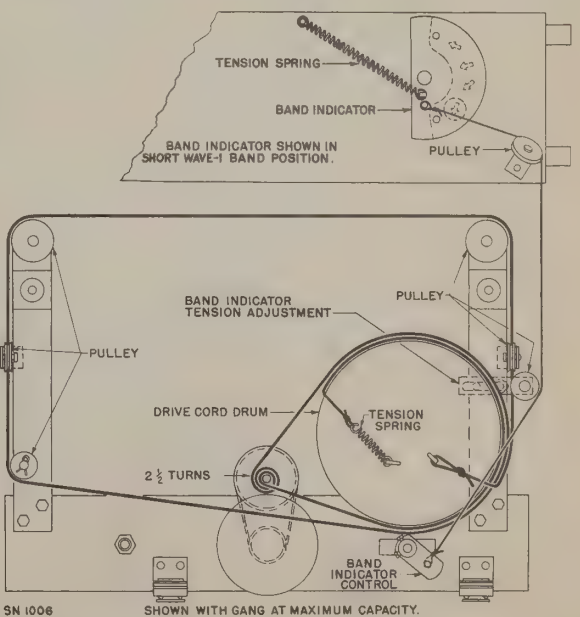
5. Dress C-34 and R-11 along chassis above volume control.



Location of Controls

Caution!

Before replacing ballast resistor, check rectifier and plate circuits to be sure that there are no shorts which would cause the ballast to burn out.



Drive Cord and Indicator Arrangement

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
34401	Arm—Band indicator arm and hub—less cable fastens on range switch shaft
35183	Ballast—Ballast tube resistor
34400	Belt—Drive belt
33821	Capacitor—Mica trimmer comprising 3 sections of 2-10 mmfd. each, and 1 section of 3-30 mmfd.
12714	Capacitor—Air trimmer 2-12 mmfd.
33818	Capacitor—Mica trimmer comprising 2 sections of 2-20 mmfd.
33822	Capacitor—Mica trimmer comprising 4 sections of 3-30 mmfd. each
12898	Capacitor—15 mmfd. (C43)
13545	Capacitor—39 mmfd. (C16)
12723	Capacitor—56 mmfd. (C24)
12720	Capacitor—100 mmfd. (C31, C39, C42)
32239	Capacitor—110 mmfd.
30232	Capacitor—200 mmfd. (C6)
33760	Capacitor—220 mmfd.
12694	Capacitor—220 mmfd. (C5, C17, C22, C32)
33235	Capacitor—580 mmfd. (C13)
12811	Capacitor—3,600 mmfd. (C10)
31405	Capacitor—6,000 mmfd. (C7)
34459	Capacitor—.0025 mfd. (C36)
33584	Capacitor—.005 mfd. (C34, C35)
4937	Capacitor—.01 mfd. (C38, C47)
4870	Capacitor—.025 mfd. (C52)
5196	Capacitor—.035 mfd. (C33)
32787	Capacitor—.05 mfd. (C30, C46, C48, C51)
4839	Capacitor—0.1 mfd. (C29, C45, C49)
35188	Capacitor—Electrolytic comprising 3 sections of 40 mfd. each and 1 section of 10 mfd.
35186	Choke—Filter choke
33762	Coil—Antenna coil—"A," "B," and "C" band.
32823	Coil—Antenna coil "X" band
33763	Coil—Detector coil "A," "B" and "C" band
33765	Coil—Detector coil—"X" band
33764	Coil—Oscillator coil—"A," "B," and "C" band
32931	Coil—Oscillator coil—"X" band
33756	Condenser—Variable tuning condenser
34403	Control—Tone control
35187	Control—Volume control and power switch
32635	Cord—Cord for band indicator arm
32634	Cord—Station selector indicator drive cord
32713	Core—Adjustable core and stud for "A" "B" and "C" band oscillator coil
34392	Drum—Tuning condenser drive drum
31480	Lamp—Dial lamp
5119	Plug—3 contact female plug for speaker cable.
31373	Pulley—Drive cord pulley
34402	Pulley—Drive cord pulley and bracket for R.H. support
34394	Pulley—L.H. support and drive cord pulleys (2) assembled less loose pulley
34395	Pulley—R.H. support and drive cord pulleys (2) less bracket and pulley
35183	Resistor—Ballast tube resistor
35191	Resistor—27 ohms, 2 watt (R27)
14281	Resistor—68 ohms, ½ watt (R1)
30936	Resistor—120 ohms, 1 watt (R20)
2736	Resistor—180 ohms, 1 watt (R10)
13454	Resistor—270 ohms, ½ watt (R17)
30150	Resistor—3,300 ohms, 1 watt (R16)
14075	Resistor—8,200 ohms, ½ watt (R8)
13998	Resistor—22,000 ohms, ½ watt
12454	Resistor—33,000 ohms, ½ watt (R3)
12264	Resistor—220,000 ohms, ½ watt (R13)
12285	Resistor—470,000 ohms, ½ watt (R12)
13730	Resistor—1 megohm, ½ watt (R2, R4)
35190	Resistor—1.8 megohm, 1/10 watt
12679	Resistor—2.2 megohm, ½ watt (R6)
13601	Resistor—10 megohm, ½ watt (R11)
4669	Screw—No. 8-32 square head set screw for drum Stock No. 34392
34396	Shaft—Intermediate tuning condenser drive shaft and drive cord pulley, less drive pulley and set screw
34397	Shaft—Tuning knob shaft and flywheel—less drive belt pulley and set screws
35189	Socket—Dial lamp socket
34864	Socket—"Magic Eye" socket
33742	Socket—Phonograph input socket
31251	Socket—Tube socket
31418	Spring—Indicator drive cord spring
34390	Switch—Range switch
32827	Switch—Voltage change switch
33759	Transformer—1st i.f. transformer
33761	Transformer—2nd i.f. transformer
35183	Tube—Ballast tube resistor
33726	Washer—"C" washer for shafts
	SPEAKER ASSEMBLIES (RL-90-1)
13866	Cap—Dust cap
35193	Cone—Speaker cone complete with voice coil
5118	Plug—3 prong male plug for speaker
35192	Speaker—8-inch permanent magnet speaker complete with cone and voice coil—less output transformer and plug
14628	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
30716	Clip—"Magic Eye" clip
X-821	Cloth—Grille cloth
32836	Cord—Power cord
35195	Cover—Back cover less power cord
35194	Dial—Glass dial scale
34485	Frame—Dial frame complete—less dial pointer shaft, pointer and carriage, band indicator, spring and Magic Eye clip
34488	Indicator—Band indicator
34487	Indicator—Station selector indicator and carriage
34489	Knob—Range switch, volume control or tuning knob
34490	Knob—Tone control knob
35029	Mounting—Speaker hardware mounting parts
33438	Screw—"Magic Eye" clip screw
34492	Shaft—Extension shaft
34491	Shaft—Indicator pointer guide shaft
30756	Spring—Band indicator spring
14270	Spring—Retaining spring for knobs Stock No. 34489, 34490
33726	Washer—Band indicator washer

RCA Victor

Models 9TX-21, -22, and -23

Chassis No. RC-403 RC-403 RC-403A

Five-Tube, Single-Band, AC-DC Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 5—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 530-1,720 kc

TUBE COMPLEMENT

(1) RCA-6A8 ..... 1st-Detector—Oscillator
(2) RCA-6SK7 ..... I-F Amplifier
(3) RCA-6SQ7 ..... 2nd-Det., 1st A-F, and A.V.C.
(4) RCA-25L6 ..... Power Output
(5) RCA-25Z6 ..... Half-Wave Rectifier
Dial Lamp (1) ..... Mazda 47, 6.3 volts, .15 amp.

POWER SUPPLY RATINGS

A-C Rating ..... 105-125 volts, 50-60 cycles, 50 watts
D-C Rating ..... 105-125 volts, direct current, 50 watts

INTERMEDIATE FREQUENCY ..... 455 kc

POWER OUTPUT (125 volt, 60 cycle supply)

Undistorted ..... 1.5 watts
Maximum ..... 2.0 watts

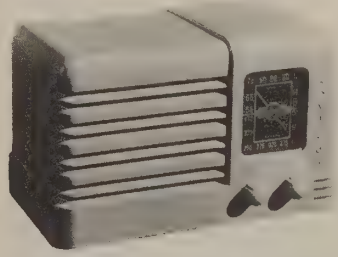
LOUDSPEAKER (39105-1)

Type ..... 4-inch Electrodynamic

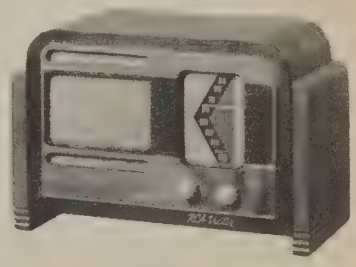
Cabinet Dimensions, 5⅞ in. high, 8½ in. wide, 4¼ in. deep.

Weight (approx.) ..... 7 pounds (shipping)

Model 9TX-21, Molded Cabinet, Walnut Finish, Mottled Tan Knobs



Model 9TX-22, Molded Cabinet, Ivory Finish, Ivory Knobs



Model 9TX-23, Wood Cabinet, Mottled Tan Knobs, Thermometer-Type Tuning Indicator

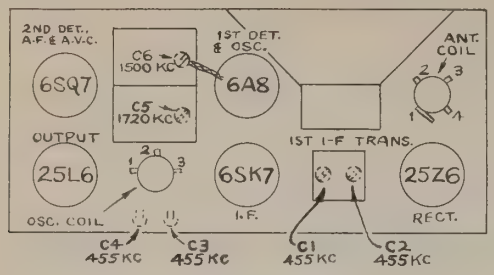
Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
X-638	Cabinet for 9TX21 (Walnut Finish).....(net)		32943	Nut—Speed nut to fasten dial—Models 9TX21 and 9TX22	
X-639	Cabinet for 9TX22 (Ivory Finish).....(net)		33292	Plate—Dial color plate—Model 9TX23	
X-640	Cabinet for 9TX23 (Wood-Walnut Finish).(net)		33294	Pulley—Drive cord pulley—Model 9TX23	
32572	Coil—Antenna coil		14439	Resistor—100 ohms, ½ watt	
32573	Coil—Oscillator coil		32535	Resistor—120 ohms, wire wound	
13057	Condenser—60 mmfd.		12412	Resistor—47,000 ohms, ½ watt	
12488	Condenser—250 mmfd.		12264	Resistor—220,000 ohms, ½ watt	
12952	Condenser—300 mmfd.		12285	Resistor—470,000 ohms, ½ watt	
30433	Condenser—400 mmfd.		12679	Resistor—2.2 meg., ½ watt	
4858	Condenser—.01 mfd.		13601	Resistor—10 meg., ½ watt	
4870	Condenser—.025 mfd.		32945	Shaft—Tuning knob shaft—Models 9TX21 and 9TX22	
4886	Condenser—.05 mfd.		33293	Shaft—Tuning knob shaft and bushing—Model 9TX23	
4839	Condenser—0.1 mfd.		33290	Socket—Dial lamp socket	
32576	Condenser—Electrolytic, one section 20 mfd., one section 12 mfd.		32537	Socket—Tube socket	
32944	Condenser—2-gang variable tuning		32575	Speaker—Complete with transformer	
32634	Cord—Drive cord		32947	Spring—Drive cord tension spring—Models 9TX21 and 9TX22	
32577	Cord—Resistance power cord		31615	Spring—Drive cord tension spring—Model 9TX23	
32942	Dial—Glass dial scale—Models 9TX21, 9TX22.		33296	Spring—Drive drum retaining spring—Model 9TX23	
33289	Dial—Glass dial scale—Model 9TX23		32667	Spring—drive drum retaining spring	
33297	Drive—Dial drive mechanism comprising drive drum, cord, shaft, dial color plate, back plate and pulleys assembled—Model 9TX23		32574	Transformer—First i. f., transformer	
32946	Drum—Variable condenser drive drum and indicator disc—Models 9TX21 and 9TX22		32581	Transformer—Output transformer	
33006	Feet—Rubber feet for 9TX23		32534	Transformer—Second i. f. transformer	
33295	Indicator—Dial pointer—Model 9TX23		32578	Volume Control and power switch—Models 9TX21 and 9TX22	
32447	Knob—Ivory knob (tuning or volume) Model 9TX22		33291	Volume Control and switch—Model 9TX23	
32571	Knob—Tan knob (tuning or volume) Models 9TX21 and 9TX23				
31480	Lamp—Dial lamp—Mazda 47				
12409	Lead—Antenna lead				

Alignment Procedure

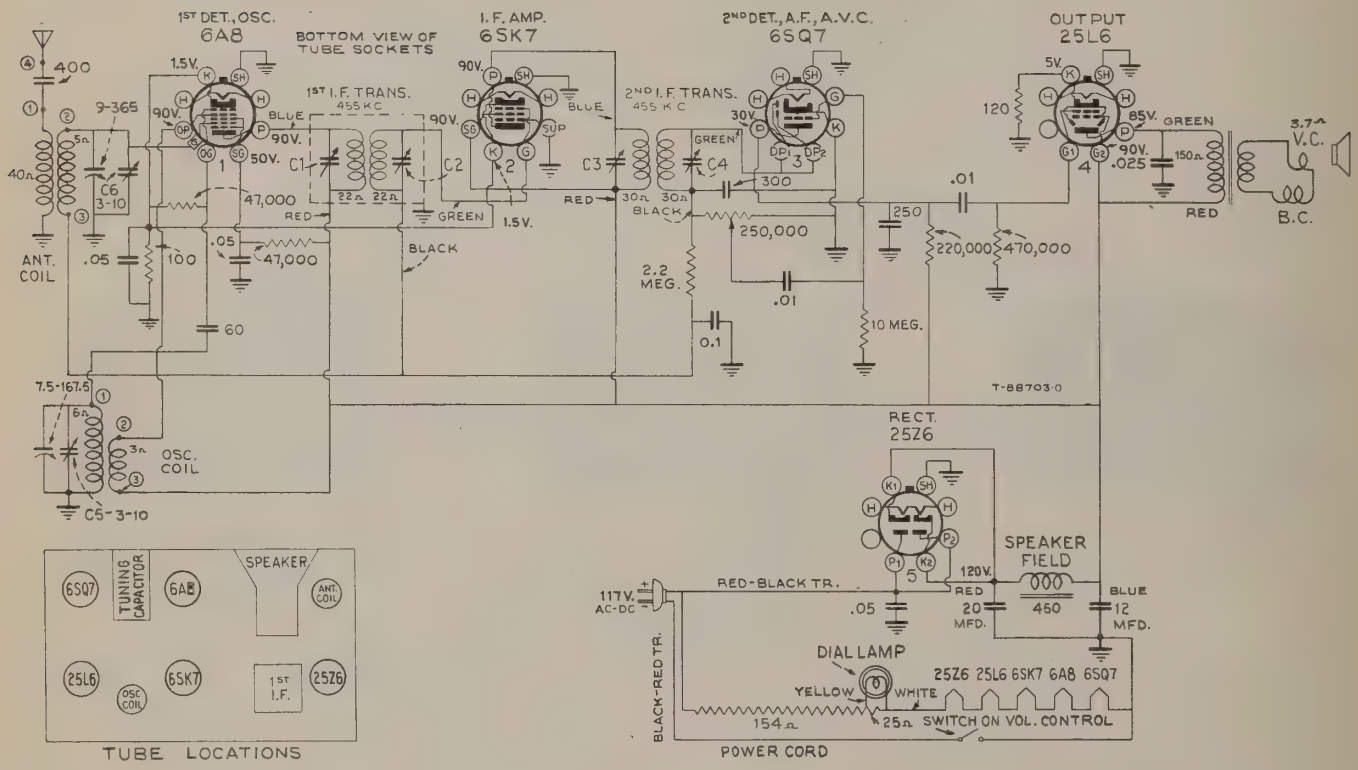
Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.



Trimmer Locations

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible. The antenna should be rolled up and kept at least one foot from chassis during alignment.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	6A8 1st-Det. grid cap, in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna term. of ant. trans. in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal.	C6 (antenna)



Schematic Circuit Diagram

Precautionary Lead Dress

1. Dress 1st I-F plate and grid leads against chassis and away from each other. Dress plate lead from 6SK7 close to chassis.
2. Dress electrolytic capacitor against rear apron.
3. Keep leads away from adjusting screws to allow easy access.
4. Dress output plate lead along front apron and away from 6A8.
5. Dress parts at ends of chassis to clear cabinet bosses.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Resistor in Power Cord.—The power cord contains a resistor which becomes warm during operation.

Antenna.—The set is equipped with length of antenna wire. Do not connect the antenna to ground. If an outdoor antenna is used, it should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

RCA Victor

MODELS 9TX-31, 9TX-32, 9TX-33

Chassis No. RC-405, RC-405A, RC-405B

Five-Tube, Single-Band, AC-DC Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 6—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U.S.A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 530-1,720 kc

TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st-Detector—Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-35L6GT ..... Power Output
(5) RCA-35Z4GT ..... Half-Wave Rectifier

Dial Lamp (1) ..... Mazda 47, 6.3 volts, .15 amp.

POWER SUPPLY RATINGS
A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

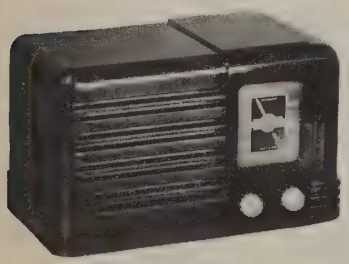
INTERMEDIATE FREQUENCY ..... 455 kc

POWER OUTPUT (125 volt, 60 cycle supply)
Undistorted ..... 1.5 watts
Maximum ..... 2.0 watts

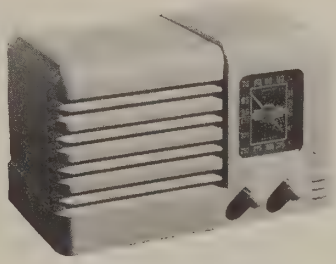
LOUDSPEAKER (39105-2)
Type ..... 4-inch Electrodynamic

		Height	Width	Depth
Cabinet Dimensions	9TX-31	5⅛ inches	8⅝ inches	4½ inches
	9TX-32	5⅛ inches	8⅝ inches	4½ inches
	9TX-33	6½ inches	9¾ inches	4¾ inches

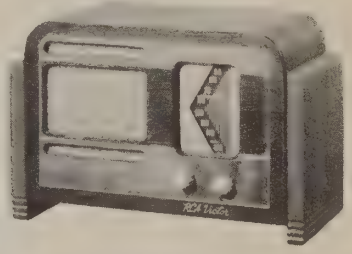
Weight (net) ..... 9TX-31, 32.. 4¾ pounds; 9TX-33.. 5½ pounds



Model 9TX-31
Walnut Finish, Tan Knobs



Model 9TX-32
Ivory Finish, Ivory Knobs



Model 9TX-33
Heart Walnut, Ornamental Sides
Tan Knobs

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
X-638	Cabinet for 9TX31 (Walnut Finish).....(net)		33297	Drive—Dial drive mechanism—comprising drive drum, cord, shaft, dial color plate, back plate and pulleys assembled (Model 9TX33).....	
X-639	Cabinet for 9TX32 (Ivory Finish).....(net)				
X-640	Cabinet for 9TX33 (Wood—Walnut Finish)...(net)		32946	Drum—Variable condenser drive drum and indicator disc (Models 9TX31 and 9TX32).....	
12488	Capacitor—250 mmfd.		33006	Feet—Rubber feet for 9TX33.....	
12952	Capacitor—300 mmfd.		33295	Indicator—Dial pointer (Model 9TX33).....	
4838	Capacitor—.005 mfd.....		32447	Knob—Ivory knob (tuning or volume) (Model 9TX32)	
4937	Capacitor—.01 mfd.....		32571	Knob—Tan knob (tuning or volume) (Models 9TX31 and 9TX33).....	
12484	Capacitor—0.25 mfd.....		31480	Lamp—Dial lamp—Mazda 47.....	
32572	Coil—Antenna coil		12409	Lead—Antenna lead.....	
32962	Coil—Oscillator coil.....		32943	Nut—Speed nut to fasten dial (Models 9TX31 and 9TX32).....	
13057	Condenser—60 mmfd.....		33292	Plate—Dial color plate (Model 9TX33).....	
30433	Condenser—400 mmfd.		33294	Pulley—Drive cord pulley (Model 9TX33)....	
4870	Condenser—.025 mfd.....		32970	Resistor—Dial lamp resistor—24 ohms.....	
4839	Condenser—0.1 mfd.....		32971	Resistor—Series dropping resistor—42 ohms...	
32576	Condenser—Electrolytic, one section 20 mfd., one section 12 mfd.....		13428	Resistor—150 ohms, ½ watt.....	
32968	Condenser—2-gang variable tuning.....		30538	Resistor—330 ohms, ½ watt.....	
32634	Cord—Drive cord.....				
32942	Dial—Glass dial scale (Models 9TX31, 9TX32)				
33289	Dial—Glass dial scale (Model 9TX33).....				

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
13998	Resistor—22,000 ohms, ½ watt		32947	Spring—Drive cord tension spring (Models 9TX31 and 9TX32)	
12412	Resistor—47,000 ohms, ½ watt		31615	Spring—Drive cord tension spring (Model 9TX33)	
12264	Resistor—220,000 ohms, ½ watt		33296	Spring—Drive drum retaining spring (Model 9TX33)	
12285	Resistor—470,000 ohms, ½ watt		32667	Spring— drive drum retaining spring	
12679	Resistor—2.2 meg., ½ watt		32966	Transformer—First i-f transformer	
13601	Resistor—10 meg., ½ watt		32967	Transformer—Second i-f transformer	
32945	Shaft—Tuning knob shaft (Models 9TX31 and 9TX32)		32964	Transformer—Output transformer	
33293	Shaft—Tuning knob shaft and bushing (Model 9TX33)		32578	Volume Control and power switch (Models 9TX31 and 9TX32)	
32969	Socket—Dial lamp socket				
14278	Socket—Phonograph socket				
32537	Socket—Tube socket				
32963	Speaker—Complete with transformer				

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output[1]—
1	Tuning condenser stator (osc.) in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna term. of ant. trans. in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C6 (antenna)

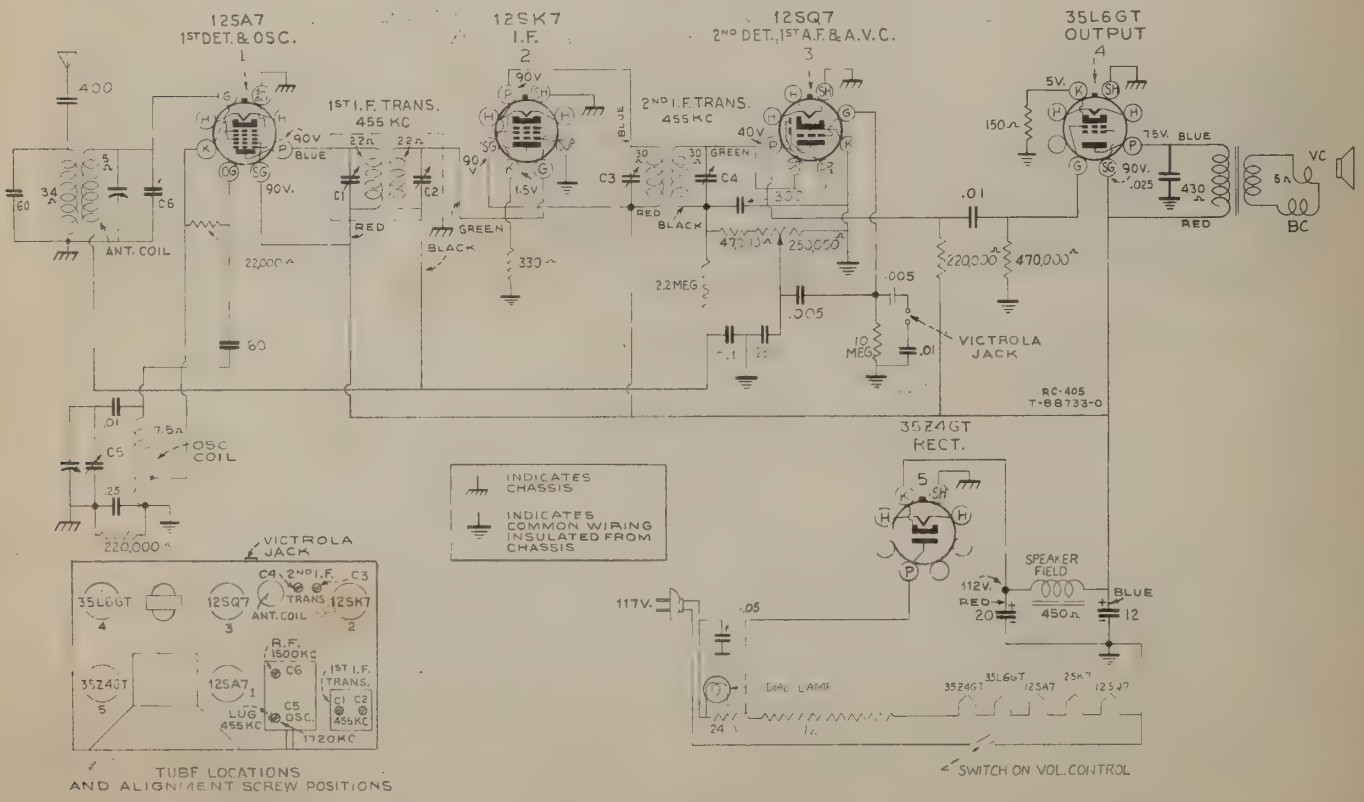
Precautionary Lead Dress

1. Dress 1st I-F plate and grid leads against chassis and away from each other. Dress plate lead from 12SK7 close to chassis.
2. Dress electrolytic capacitor against rear apron.

Power-Supply Polarity. — For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Antenna.—The set is equipped with length of antenna wire. Do not connect the antenna to ground. If an outdoor antenna is used, it should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Victrola Attachment.—A jack is provided on the rear of chassis for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.



Schematic Circuit Diagram

RCA Victor

Model 9TX-50 Series (Chassis No. RC-435)

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

with Built-in Loop Antenna

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 14—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,720 kc
Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-35L6GT ..... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier

Dial Lamp (1) ..... Mazda 47, 6.3 volts, .15 amp.

POWER SUPPLY RATINGS
A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)
Undistorted ..... 1.5 watts
Maximum ..... 2.0 watts

LOUDSPEAKER
Type ..... 4-inch Electrodynamic
Cabinet Dimensions (inches) .. Height 7¼, Width 11⅛, Depth 6¼
Weight (net) ..... 6¾ pounds

General Description

Model 9TX-50

Light Mahogany Cabinet

Model 9TX-50M

Regular Mahogany Cabinet

Features of design include: New Type, single-ended tubes (12SA7, 12SK7, and 12SQ7); edge-lighted dial; dust-proof electrodynamic loudspeaker; "Magic Voice"; "Magic Loop"; Television-Victrola Jack; and Beam Power Output.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC—435)		31480	Lamp—Pilot Lamp	
			33663	Loop—Antenna loop	
32968	Capacitor—2 gang variable tuning		33294	Pulley—Drive cord pulley	
13057	Capacitor—60 mmfd.		33558	Resistor—86 ohms	
12488	Capacitor—250 mmfd.		13428	Resistor—150 ohms, ½ watt	
12952	Capacitor—300 mmfd.		14561	Resistor—220 ohms, ½ watt	
4838	Capacitor—.005 mfd.		13998	Resistor—22,000 ohms, ½ watt	
32787	Capacitor—.05 mfd.		12738	Resistor—27,000 ohms, ½ watt	
4839	Capacitor—.1 mfd.		12264	Resistor—220,000 ohms, ½ watt	
12484	Capacitor—.25 mfd.		12285	Resistor—470,000 ohms, ½ watt	
32576	Capacitor—Electrolytic 20-12 mfd.		12679	Resistor—2.2 meg. ½ watt	
32962	Coil—Oscillator coil		13601	Resistor—10 meg. ½ watt	
32634	Cord—Drive cord		33293	Shaft—Tuning knob shaft and bushing	
33662	Drum—Drive cord and indicator drum		33557	Socket—Dial Light	
33295	Indicator—Dial pointer		32537	Socket—Tube Socket	
			31615	Spring—Drive cord tension spring	

First Edition

Trademark "Victrola" "Magic Voice" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
33296	Spring—Drum retaining spring		33741	Transformer—Output	
32966	Transformer—I. F. Input			MISCELLANEOUS ASSEMBLIES	
32967	Transformer—I. F. Output		33289	Dial—Dial Scale	
33291	Volume Control		33006	Foot—Rubber foot for cabinet	
	SPEAKER ASSEMBLIES		32571	Knob—Tuning or volume control knob	
	(Speaker No. 39105-2)		33742	Socket—Phonograph input socket	

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that top edge of pointer just touches rivet in dial plate.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

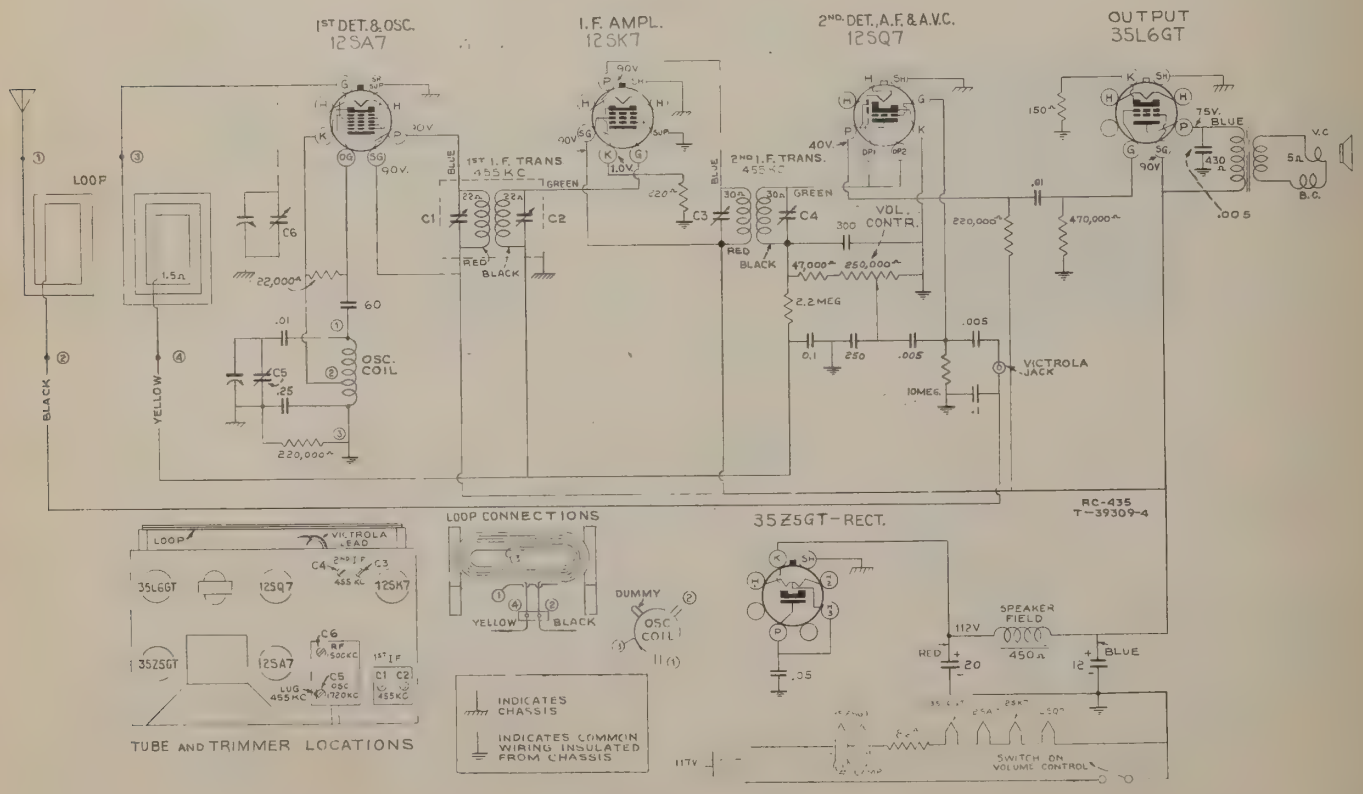
Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Victrola Attachment.—A jack is provided on the rear of cabinet for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Tuning condenser stator (osc.) in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna term. of ant. loop in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C6 (antenna)

Precautionary Lead Dress

1. Dress 2nd I-F green lead close to chassis and under other parts.
2. Dress lead from gang condenser to grid of 12SA7 close to chassis and away from 12SQ7 socket.
3. Dress blue 1st I-F lead under volume control close to chassis.
4. Dress blue 2nd I-F lead close to chassis and behind 12SK7 socket.



Schematic Circuit Diagram

RCA Victor

MODELS 9TX-50, 9TX-50M, 2nd Production (Chassis No. RC-454)

MODELS 40X-52, 40X-55, 2nd Production (Chassis No. RC-453)

Five-Tube, Single-Band, AC-DC, Superheterodyne, Loop Receivers

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 43 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,650 kc
Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier

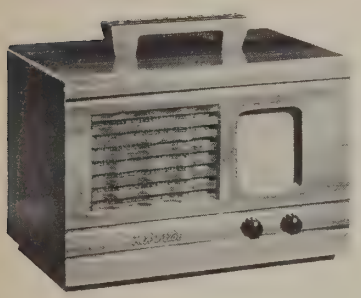
Dial Lamp (1) ..... Mazda 51, 7.5 volts, 0.2 amp.

POWER SUPPLY RATINGS
A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)
Undistorted ..... .6 watts
Maximum ..... 2.0 watts

LOUDSPEAKER
Type ..... 5-inch Electrodynamic

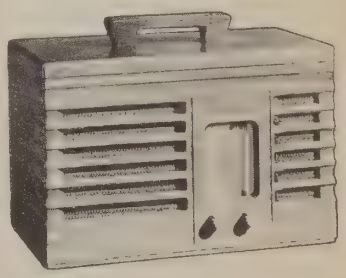
General Description



Model 40X-55

Features of design include: New Type, single-ended tubes (12SA7, 12SK7, and 12SQ7); edge-lighted dial; dust-proof electrodynamic loudspeaker; "Magic Voice" (9TX-50 and 50M); "Magic Loop"; Television-Phonograph Jack; and Beam Power Output.

Model	Description	Cabinet Dimensions Height	Width	Depth
40X-52	IVORY MODEL Ivory Finish	6⅛	9	5¾
40X-55	HONEY MAPLE MODEL Honey maple finish	6⅛	9	5¾
9TX-50	Light Mahogany Cabinet	7¼	11⅛	6¼
9TX-50M	Regular Mahogany Cabinet	7¼	11⅛	6¼



Model 9TX-50

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-453, RC-454)		32545	Control—Volume control and power switch (40X-52, 55)	
34444	Bracket—Dial and lamp support (9TX-50, 50M)		33291	Control—Volume control and power switch (9TX-50, 50M)	
34447	Capacitor—Mica trimmer, 2.5 to 30 mmfd. (C1)		32634	Cord—Tuning condenser drive cord	
13057	Capacitor—60 mmfd. (C5)		34567	Drum—Variable tuning condenser drive drum (40X-52, 55)	
4838	Capacitor—.005 mfd. (C14, C15)		34446	Eyelet—Used as pulley for drive cord (9TX-50, 50M)	
4937	Capacitor—.01 mfd. (C16)		11765	Lamp—Dial lamp	
11315	Capacitor—.015 mfd. (C17)		34445	Pointer—Dial pointer (9TX-50, 50M)	
32787	Capacitor—.05 mfd. (C18)		14439	Resistor—100 ohms, ½ watt (R13)	
4839	Capacitor—0.1 mfd. (C12, C24)		13428	Resistor—150 ohms, ½ watt (R9)	
12484	Capacitor—0.25 mfd. (C6)		13998	Resistor—22,000 ohms, ½ watt (R1)	
34597	Capacitor—Electrolytic comprising 1 section of 20 mfd. and 1 section of 12 mfd. (C19, C20)		12264	Resistor—220,000 ohms, ½ watt (R2, R7)	
34592	Coil—Loop loading coil		12285	Resistor—470,000 ohms, ½ watt (R8)	
34443	Coil—Oscillator coil		12679	Resistor—2.2 megohm, ½ watt (R4)	
34448	Condenser—Variable tuning condenser (40X-52, 55)		13601	Resistor—10 megohm, ½ watt (R6)	
34440	Condenser—Variable tuning condenser (9TX-50, 50M)		33061	Shaft—Tuning condenser drive shaft (40X-52, 55)	

Trademark "Victrola," "Magic Voice," "Victor," "RC A Victor," Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

First Edition

Printed in U. S. A.

Replacement Parts (Continued)

STOCK No.	DESCRIPTION
34332	Shaft—Tuning condenser drive shaft (9TX-50, 50M)
34449	Socket—Dial lamp socket
31319	Socket—Tube socket
30585	Spring—Tuning condenser drive cord spring (40X52, 55)
31615	Spring—Drive cord spring (9TX-50, 50M)
34441	Transformer—1st I.F. transformer
34442	Transformer—2nd I.F. transformer
	SPEAKER ASSEMBLIES (40X-52, 9TX-50 and 9TX-50M) (39223-1)
35065	Cone—Cone complete with voice coil
34450	Speaker—5" dynamic speaker complete with cone and voice coil less output transformer
34174	Transformer—Output transformer

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES 40X-55 (RL86-1)
32907	Cap—Dust cap
35066	Cone—Cone complete with voice coil
34450	Speaker—5" dynamic speaker complete with cone and voice coil less output transformer
35056	Transformer—Output transformer
	MISCELLANEOUS
33744	Dial—Dial scale—glass (40X-52, 55)
33289	Dial—Dial scale (9TX-50, 50M)
34016	Knob—Walnut tuning or volume control knob (40X-52, 55)
34015	Knob—Tuning or volume control knob (9TX-50, 50M)

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Steps	Connect the test oscillator to—	Tune test-osc. to—	Turn Radio Dial to—	Adjust the following for maximum peak output
1	Tuning Condenser stator (ant.) in series with .1 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C7, C8, C9 (1st and 2nd I-F transformers)
2	Radiation Loop consisting of 2 turns of wire 18 in. in diameter located 4 to 6 feet from receiver	1,650 kc	Full clockwise (out of mesh)	C4 (oscillator)
3		600 kc	Resonance on 600 kc signal	L1 (Loop inductance)
4		1,400 kc	Resonance on 1,400 kc signal	C2 (Antenna)

Precautionary Lead Dress:

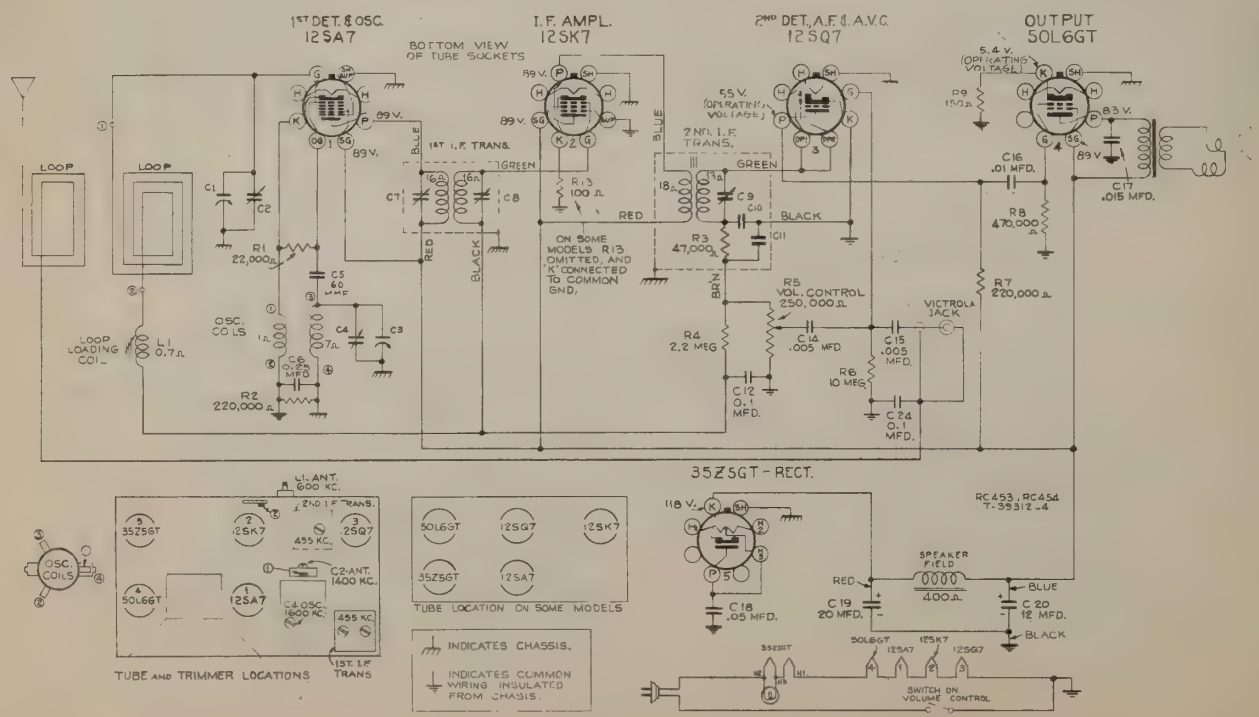
1. Green and blue leads from 1st I.F. transformer must be kept separated.

2. Dress yellow lead from loudspeaker under green lead from hum bucking coil to prevent it from touching the 50L6GT.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Victrola Attachment.—A jack is provided on the rear of cabinet for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.



RCA Victor

Models 40X-30 and 40X-31 (Chassis No. RC405C & D)

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver with Built-in Loop Antenna

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 34—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,680 kc
Intermediate Frequency ..... 455 kc

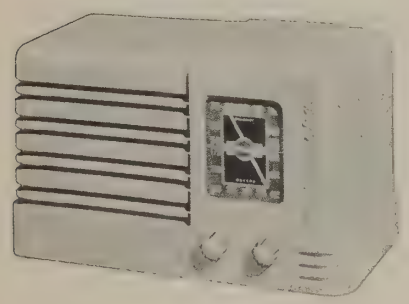
TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-35L6GT ..... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier
Dial Lamp (1) ..... Mazda 51, 7.5 volts, 0.2 amp.

POWER SUPPLY RATINGS
A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)
Undistorted ..... .6 watts
Maximum ..... 2.0 watts

LOUDSPEAKER
Type ..... 4-inch Electrodynamic
Cabinet Dimensions (inches) .. Height 5-1/16, Width 8½, Depth 4¼
Weight (net) ..... 4¾ pounds

General Description



Model 40X-30
Walnut Finish Plastic Cabinet

Model 40X-31
Ivory Finish Plastic Cabinet

Features of design include: New Type single-ended tubes (12SA7, 12SK7, and 12SQ7); edge-lighted dial; dust proof electrodynamic loudspeaker; "Magic Loop"; Television-Victrola Jack; and Beam Power Output.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES		33808	Loop—Antenna loop for 40X31	
13057	Capacitor—60 mmfd.		33558	Resistor—Series resistor—86 ohms	
12488	Capacitor—250 mmfd.		13428	Resistor—150 ohms, ½ watt	
12952	Capacitor—300 mmfd.		14561	Resistor—220 ohms ½ watt	
4838	Capacitor—.005 mfd.		13998	Resistor—22,000 ohms, ½ watt	
4937	Capacitor—.01 mfd.		12412	Resistor—47,000 ohms, ½ watt	
4870	Capacitor—.025 mfd.		12264	Resistor—220,000 ohms, ½ watt	
32787	Capacitor—.05 mfd.		12285	Resistor—470,000 ohms, ½ watt	
4839	Capacitor—0.1 mfd.		12679	Resistor—2.2 meg., ½ watt	
12484	Capacitor—.25 mfd.		13601	Resistor—10 meg., ½ watt	
32576	Capacitor—Electrolytic, one section 20 mfd., one section 12 mfd.		32945	Shaft—Tuning knob shaft and bearing	
34259	Coil—Oscillator coil		33742	Socket—Phonograph input socket	
32968	Condenser—Variable tuning condenser		33557	Socket—Pilot lamp socket	
32578	Control—Volume control and power switch		32537	Socket—Tube socket	
32634	Cord—Drive cord		30585	Spring—Tuning condenser drive cord spring	
32946	Drum—Variable condenser drive drum and indicator disc		32966	Transformer—First i-f transformer	
11765	Lamp—Pilot lamp		32967	Transformer—Second i-f transformer	
33807	Loop—Antenna loop for 40X30			SPEAKER ASSEMBLIES 39105-2	

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
32964	Transformer—Output transformer		32447	Knob—Ivory tuning, volume and power knob Model 40X31	
	MISCELLANEOUS ASSEMBLIES		32571	Knob—Tan tuning, volume and power knob Model 40X30	
32942	Dial—Glass dial scale		32943	Nut—Speed nut to fasten dial	

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-setting Dial.—With gang condenser in full mesh, the pointer should be horizontal.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT." terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

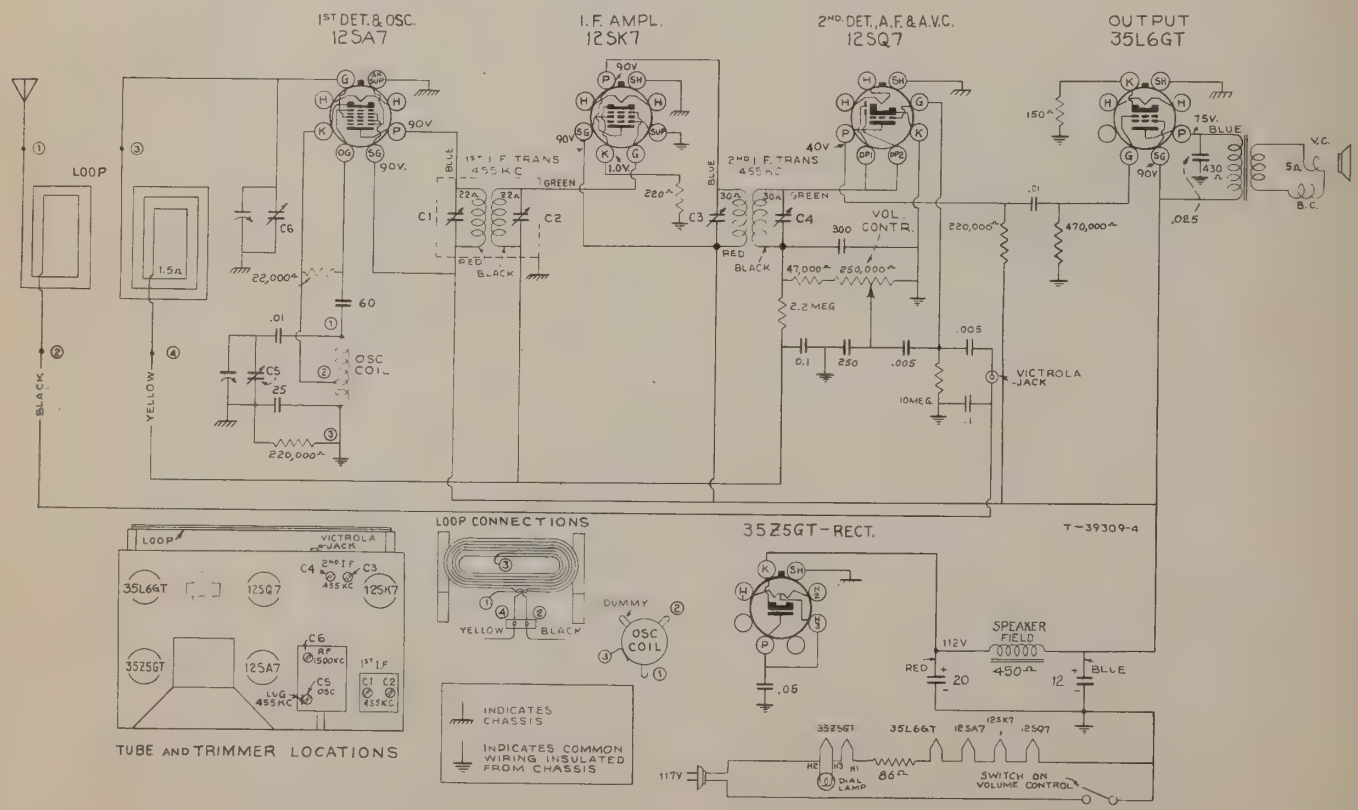
Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Victrola Attachment.—A jack is provided on the rear of cabinet for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Tuning condenser stator (osc.) in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna term. of ant. loop in series with 100 mmfd.	1,680 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C6 (antenna)

Precautionary Lead Dress

1. Dress 2nd I-F green lead close to chassis and under other parts.
2. Dress lead from gang condenser to grid of 12SA7 close to chassis and away from 12SQ7 socket.
3. Dress blue 1st I-F lead under volume control close to chassis.
4. Dress blue 2nd I-F lead close to chassis and behind 12SK7 socket.



Schematic Circuit Diagram

RCA Victor

Model 40X-50 Series (Chassis No. RC-436)

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver with Built-in Loop Antenna

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 24—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,720 kc
Intermediate Frequency ..... 455 kc

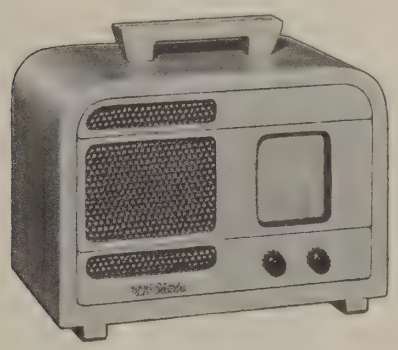
TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-35L6GT or 50L6GT (see schematic) .... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier

POWER SUPPLY RATINGS
A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)
Undistorted ..... .6 watts
Maximum ..... 2.0 watts

LOUDSPEAKER
Type ..... 4-inch Electrodynamic

General Description



Model 40X-50

The following models comprise the 40X-50 Series—all contain the No. RC-436 chassis.

Model	Description	Cabinet Dimensions Height	Width	Depth
40X-50	"MODERN BLONDE" Blonde mahogany finish	6½	9	5¾
40X-51	COLONIAL MODEL Maple finish	6½	9	5¾
40X-52	IVORY MODEL Ivory finish	6½	9	5¾
40X-53	"LA SIESTA" MODEL Mexican Scene	6½	9	5¾
40X-54	TREASURE CHEST MODEL Weathered walnut finish	6½	9⅝	6⅛
40X-55	HONEY MAPLE MODEL Honey maple finish	6½	9	5¾
40X-56	WORLD'S FAIR MODEL New York World's Fair scene	6½	9⅝	5⅞
40X-57	GOLDEN GATE MODEL San Francisco Exposition scene	6⅛	9⅝	5⅞

Features of design include: New Type, single-ended tubes (12SA7, 12SK7, and 12SQ7); edge-lighted dial; dust proof electrodynamic loudspeaker; "Magic Loop"; Television-Victrola Jack; and Beam Power Output.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-436)		33663	Loop—Complete antenna loop	
33745	Cable—Phono. cable		33558	Resistor—86 ohms	
13057	Capacitor—60 mmfd.		12071	Resistor—120 ohms, ½ watt	
12488	Capacitor—250 mmfd.		13428	Resistor—150 ohms, ½ watt	
12952	Capacitor—300 mmfd.		14561	Resistor—220 ohms, ½ watt	
4838	Capacitor—.005 mfd.		13998	Resistor—22,000 ohms, ½ watt	
4870	Capacitor—.025 mfd.		12412	Resistor—47,000 ohms, ½ watt	
32787	Capacitor—.05 mfd.		12264	Resistor—220,000 ohms, ½ watt	
4839	Capacitor—.1 mfd.		12285	Resistor—470,000 ohms, ½ watt	
12484	Capacitor—.25 mfd.		12679	Resistor—2.2 meg., ½ watt	
32576	Capacitor—Electrolytic, 20-12 mfd.		13601	Resistor—10 meg., ½ watt	
32968	Capacitor—Variable tuning		33061	Shaft—Drive shaft	
32962	Coil—Oscillator coil		30585	Spring—Drive cord spring	
32634	Cord—Drive cord		33557	Socket—Dial light socket	
33743	Drum—Drive drum		32537	Socket—Tube socket	
			32966	Transformer—I-F input transformer	

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
32967	Transformer—I-F output transformer		32895	Knobs—Tuning and volume—Models 40X50, 40X51, 40X52, 40X55, 40X56, 40X57 (Walnut)	
32545	Volume control				
	SPEAKER ASSEMBLIES (39105-2)		32893	Knobs—Tuning and volume—Model 40X53 (Red)	
32964	Transformer—Output transformer		32571	Knobs—Tuning and volume—Model 40X54 (Tan)	
	MISCELLANEOUS ASSEMBLIES				
33744	Dial—Glass dial scale		33742	Socket—Phonograph input socket	

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-setting Dial.—With gang condenser in full mesh, the pointer should be horizontal.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

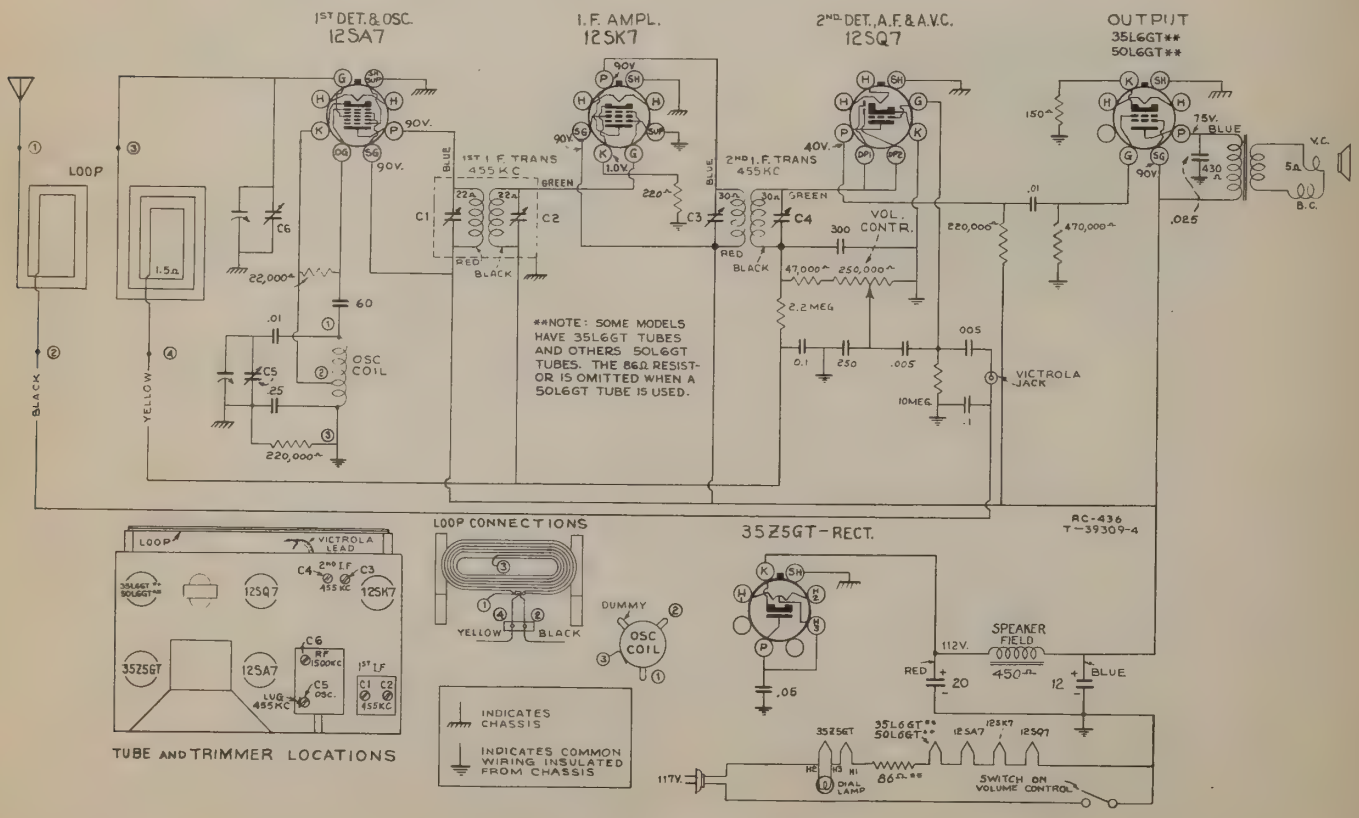
Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Victrola Attachment.—A jack is provided on the rear of cabinet for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Tuning condenser stator (osc.) in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna term. of ant. loop in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C6 (antenna)

Precautionary Lead Dress

1. Dress 2nd I-F green lead close to chassis and under other parts.
2. Dress lead from gang condenser to grid of 12SA7 close to chassis and away from 12SQ7 socket.
3. Dress blue 1st I-F lead under volume control close to chassis.
4. Dress blue 2nd I-F lead close to chassis and behind 12SK7 socket.



Schematic Circuit Diagram

NOTE: Output cathode resistor is 120 ohm when 50L6GT tube is used.

RCA Victor

Model 45E Series (Chassis No. RC-435A)

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

with Built-in Loop Antenna

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 27—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,720 kc
Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier
Dial Lamp (1) ..... Mazda 51, 7.5 volts, 0.2 amp.

POWER SUPPLY RATINGS
A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)
Undistorted ..... .6 watts
Maximum ..... 2.0 watts

LOUDSPEAKER
Type ..... 5-inch permanent magnet dynamic
Cabinet Dimensions (inches) ..... Height 25⅝, Width 16, Depth 10
Weight (net) ..... 17 pounds

General Description

Model 45E Maple Finish

Model 45E-M Mahogany Finish

Model 45E-W Walnut Finish

Features of design include: New Type, single-ended tubes (12SA7, 12SK7, and 12SQ7); edge-lighted dial; dust-proof loudspeaker; "Magic Voice"; "Magic Loop"; Television-Victrola Jack; and Beam Power Output.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

Stock No.	DESCRIPTION		Stock No.	DESCRIPTION	
	CHASSIS ASSEMBLIES		11765	Lamp—Dial lamp	
13057	Capacitor—60 mmfd.		33663	Loop—Antenna loop complete	
12488	Capacitor—250 mmfd.		33294	Pulley—Drive cord pulley	
12952	Capacitor—300 mmfd.		13428	Resistor—150 ohms, ½ watt	
4838	Capacitor—.005 mfd.		14561	Resistor—220 ohms, ½ watt	
32787	Capacitor—.05 mfd.		3153	Resistor—1,500 ohms, 1 watt	
4839	Capacitor—0.1 mfd.		13998	Resistor—22,000 ohms, ½ watt	
12484	Capacitor—0.25 mfd.		12412	Resistor—47,000 ohms, ½ watt	
33952	Capacitor—Electrolytic, 8 mfd.		14560	Resistor—100,000 ohms, ½ watt	
33850	Capacitor—Electrolytic, 2 sections 30 mfd. each		12264	Resistor—220,000 ohms, ½ watt	
34259	Coil—Oscillator coil		12199	Resistor—270,000 ohms, ½ watt	
32968	Condenser—Variable tuning condenser		12679	Resistor—2.2 meg., ½ watt	
32634	Cord—Drive cord		33293	Shaft—Tuning knob shaft and bushing	
33662	Drum—Drive drum		33557	Socket—Dial lamp socket	
33295	Indicator—Dial pointer		32537	Socket—Tube socket	
			31615	Spring—Drive cord spring	

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
33296	Spring—Retaining spring for drum			MISCELLANEOUS ASSEMBLIES	
32966	Transformer—First I-F transformer		33852	Dial—Glass dial scale	
32967	Transformer—Second I-F transformer		34015	Knob—Volume or tuning knob—Models 45EM, 45EW only	
33291	Volume control and switch		34016	Knob—Volume or tuning knob—Model 45E only	
	SPEAKER ASSEMBLIES (39213-1)		34043	Spring—Retaining spring for knobs Stk. 34015 and 34016	
33853	Cone—Speaker cone and voice coil				
33851	Speaker complete				
33854	Transformer—Output transformer				

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that top edge of pointer just touches rivet in dial plate.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

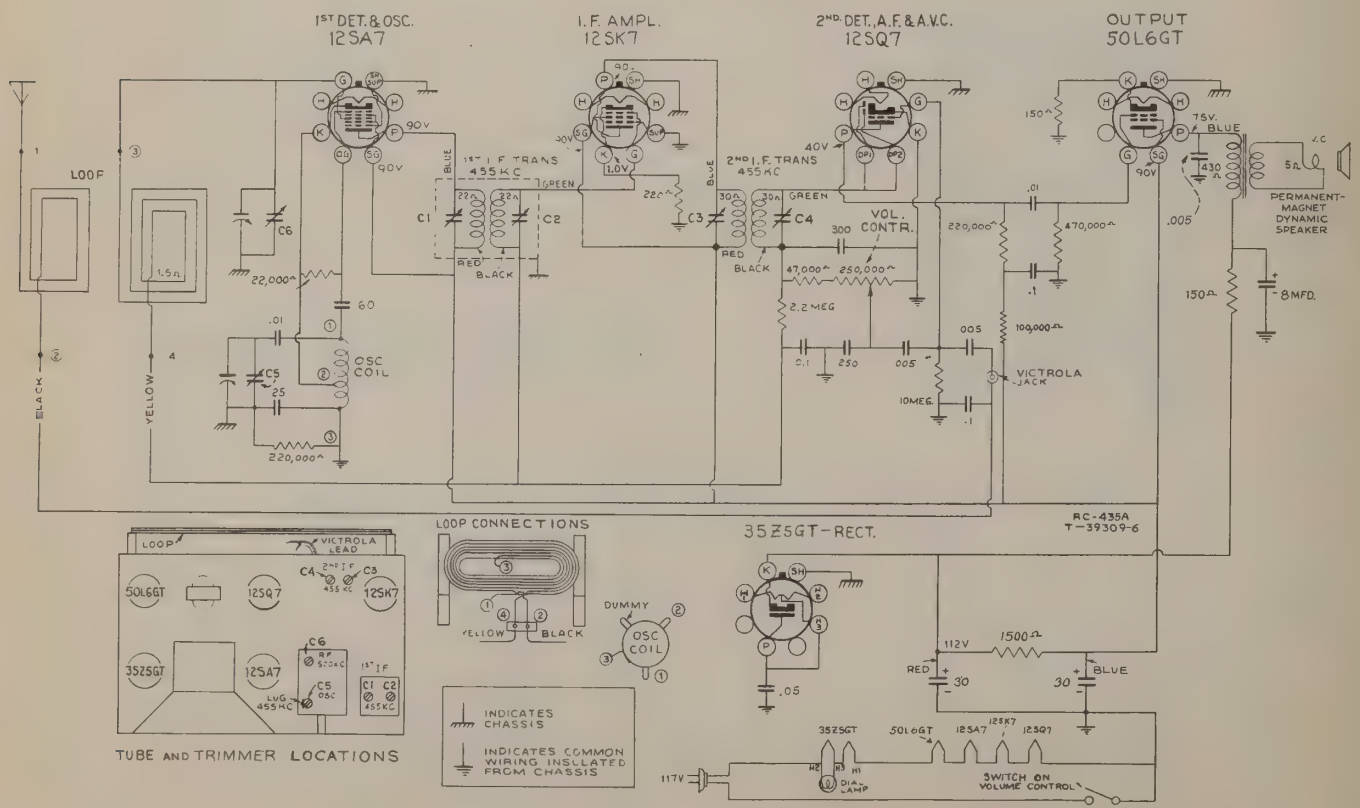
Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Victrola Attachment.—A jack is provided on the rear of cabinet for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Tuning condenser stator (osc.) in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna term. of ant. loop in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C6 (antenna)

Precautionary Lead Dress

1. Dress 2nd I-F green lead close to chassis and under other parts.
2. Dress lead from gang condenser to grid of 12SA7 close to chassis and away from 12SQ7 socket.
3. Dress blue 1st I-F lead under volume control close to chassis.
4. Dress blue 2nd I-F lead close to chassis and behind 12SK7 socket.



Schematic Circuit Diagram

RCA Victor

Models 45X1 and 45X2 (Chassis No. RC-457)

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 53—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,680 kc

Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier

Dial Lamp (1) ..... Mazda 51, 7.5 volts, 0.2 amp.

POWER SUPPLY RATINGS

A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)

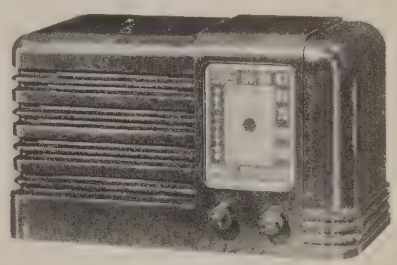
Undistorted ..... .6 watts
Maximum ..... 2.0 watts

LOUDSPEAKER

Type ..... 4-inch Electrodynamic
Cabinet Dimensions (inches) .. Height 5-1/16, Width 8¼, Depth 4¼
Weight (net) ..... 4¾ pounds

Model 45X1
Walnut Finish Plastic Cabinet

Model 45X2
Ivory Finish Plastic Cabinet



Features of design include: New Type single-ended tubes (12SA7, 12SK7, and 12SQ7); edge-lighted dial; dust proof electrodynamic loudspeaker; and Beam Power Output.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES		35118	Shield—Shield can for I.F. transformer Stock No. 35114	
13057	Capacitor—68 mmfd. (C2)		32969	Socket—Dial lamp socket	
12694	Capacitor—220 mmfd. (C3, C4)		31319	Socket—Tube socket	
33584	Capacitor—.005 mfd. (C1, C5)		30585	Spring—Drive cord tension spring	
4937	Capacitor—.01 mfd. (C6)		34846	Transformer—Audio transformer	
30856	Capacitor—.015 mfd. (C7)		35114	Transformer—1st I.F. transformer	
32787	Capacitor—.05 mfd. (C8)		33301	Transformer—2nd I.F. transformer	
4839	Capacitor—0.1 mfd. (C9)				
32576	Capacitor—Electrolytic comprising 1 section of 20 mfd and 1 section of 12 mfd.			SPEAKER ASSEMBLIES (39105-505)	
35115	Coil—Antenna coil		35120	Cone—Cone complete with voice coil	
35116	Coil—Oscillator coil		35119	Speaker—4-inch dynamic speaker complete	
34843	Condenser—Variable tuning condenser				
35113	Control—Volume control and power switch			MISCELLANEOUS ASSEMBLIES (RR-572)	
32634	Cord—Drive cord				
35117	Drum—Tuning condenser drive drum		35122	Back—Cabinet back for Model 45X1	
11765	Lamp—Dial lamp		35125	Back—Cabinet back for Model 45X2	
31193	Lead—Antenna lead		35124	Dial—Glass dial scale	
14439	Resistor—100 ohms, ½ watt (R2)		33317	Fastener—Push on fastener	
30880	Resistor—150 ohms, ½ watt (R8)		35123	Knob—Ivory tuning or volume control knob for Model 45X2	
13998	Resistor—22,000 ohms, ½ watt (R1)		35121	Knob—Walnut tuning or volume control knob for Model 45X1	
12412	Resistor—47,000 ohms, ½ watt (R3)		35126	Spring—Retaining spring for knobs Stock No. 35121 and 35123	
12264	Resistor—220,000 ohms, ½ watt (R6)				
12285	Resistor—470,000 ohms, ½ watt (R7)				
12679	Resistor—2.2 megohms, ½ watt (R4)				
13601	Resistor—10 megohms, ½ watt (R5)				
33305	Shaft—Condenser drive shaft				

Trademark "Victrola," "Magic Voice," "Victor," "RCA Victor," Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

First Edition

Printed in U. S. A.

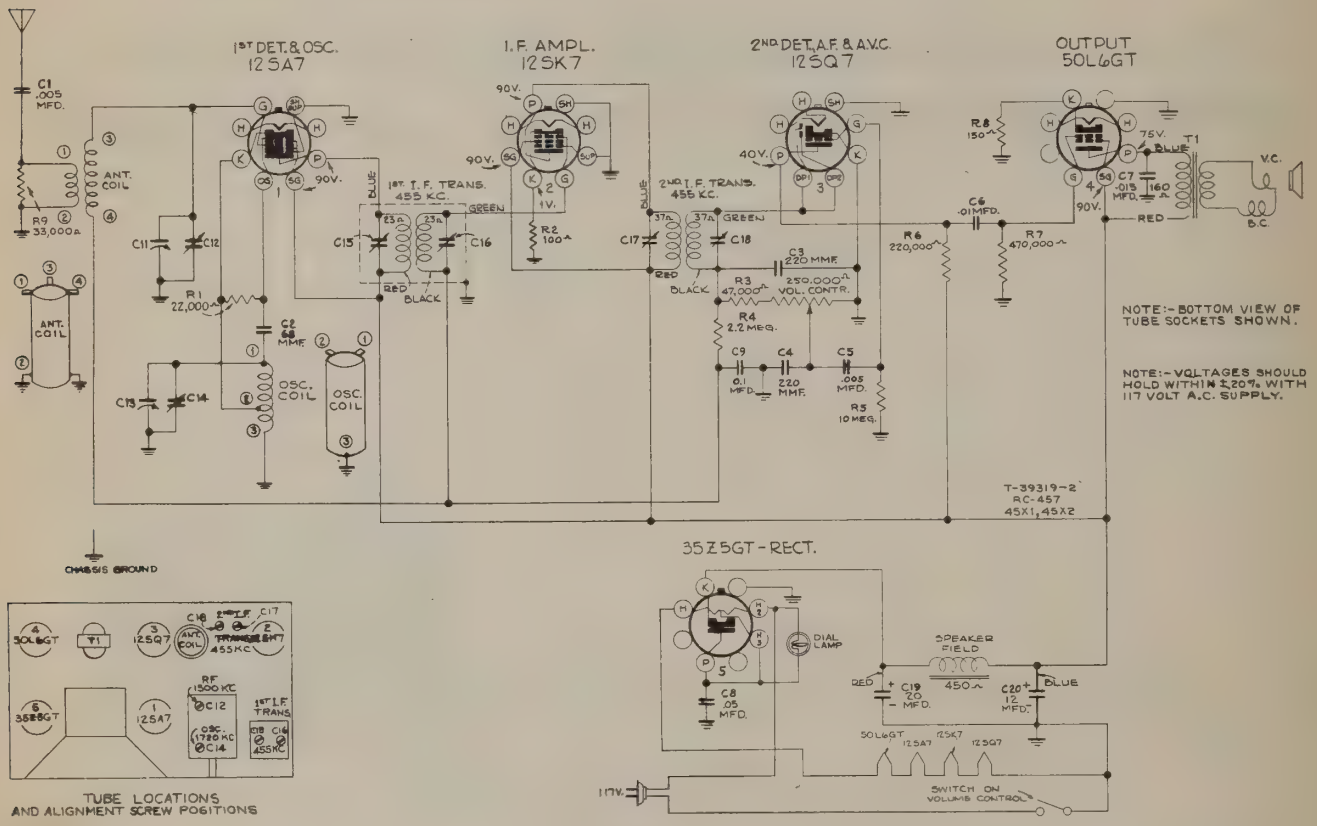
Alignment Procedure

Output Meter Alignment. — Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator. — Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Power-Supply Polarity. — For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Tuning condenser stator (osc.) in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C15, C16, C17, C18 (1st and 2nd I-F transformers)
2	Antenna term. of ant. trans. in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C14 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C12 (antenna)


1ST DET. & OSC. 12SA7
I.F. AMPL. 12SK7
2ND DET, A.F. & A.V.C. 12SQ7
OUTPUT 50L6GT
ANT. COIL
OSC. COIL
1ST I.F. TRANS. 455 KC.
2ND I.F. TRANS. 455 KC.
NOTE:- BOTTOM VIEW OF TUBE SOCKETS SHOWN.
NOTE:- VOLTAGES SHOULD HOLD WITHIN ±20% WITH 117 VOLT A.C. SUPPLY.
T-39319-2 RC-457 45X1, 45X2
35Z5GT - RECT.
SPEAKER FIELD
DIAL LAMP
SWITCH ON VOLUME CONTROL
CHASSIS GROUND
TUBE LOCATIONS AND ALIGNMENT SCREW POSITIONS

Schematic Circuit Diagram

RCA Victor

Models 45X-1 and 45X-2, 2nd Production

Chassis No. RC-457A

Five-Tube, Single-Band, AC-DC Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.
A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 535-1,720 kc

Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier

Dial Lamp (1) ..... Mazda 51, 7.5 volts, 0.2 amp.

POWER SUPPLY RATINGS

A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

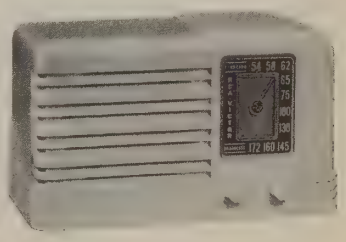
POWER OUTPUT (117 volt, 60 cycle supply) ..... 1.0 watt

LOUDSPEAKER

Type ..... 4-inch Electrodynamic
Cabinet Dimensions (inches) .. Height 5-1/16, Width 8¼, Depth 4¼
Weight (net) ..... 4¾ pounds

Model 45X1
Walnut Finish Plastic Cabinet

Model 45X2
Ivory Finish Plastic Cabinet



Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-457A)		31251	Socket—Tube socket	
			30585	Spring—Drive cord tension spring	
35332	Can—I.F. transformer shield can		35098	Spring—Spring necessary to hold I.F. transformer in can	
12694	Capacitor—220 mmfd. (C3)		34846	Transformer—Audio transformer	
33584	Capacitor—.005 mfd. (C1, C5, C6)		35331	Transformer—First i.f. transformer—less shield can	
4870	Capacitor—.025 mfd. (C7)		33301	Transformer—Second i.f. transformer	
32787	Capacitor—.05 mfd. (C8)		34373	Washer—"C" washer for drive shaft	
4839	Capacitor—0.1 mfd. (C9)				
32576	Capacitor—Electrolytic, comprising 1 section of 20 mfd. and 1 section of 12 mfd.			SPEAKER ASSEMBLIES (39105-505)	
35115	Coil—Antenna coil		35120	Cone—Cone complete with voice coil	
35333	Coil—Oscillator coil		35119	Speaker—4-inch dynamic speaker complete with cone and voice coil	
34843	Condenser—Variable tuning condenser				
35330	Control—Volume control and power switch			MISCELLANEOUS ASSEMBLIES	
32634	Cord—Drive cord		35122	Back—Cabinet back for Model 45X1	
35117	Drum—Tuning condenser drive drum		35125	Back—Cabinet back for Model 45X2	
11765	Lamp—Dial lamp		35124	Dial—Glass dial scale	
31193	Lead—Antenna lead		33317	Fastener—Push fastener to hold cabinet	
30880	Resistor—150 ohms, ½ watt (R8)		35123	Knob—Ivory tuning or volume control knob for Model 45X2	
13998	Resistor—22,000 ohms, ½ watt (R1)		35121	Knob—Walnut tuning or volume control knob for Model 45X1	
12454	Resistor—33,000 ohms, ½ watt (R9)		35126	Spring—Retaining spring for knobs, Stock Nos. 35121 and 35123	
12264	Resistor—220,000 ohms, ½ watt (R6)				
12285	Resistor—470,000 ohms, ½ watt (R7)				
12679	Resistor—2.2 meg., ½ watt (R4)				
13601	Resistor—10 meg., ½ watt (R5)				
35329	Shaft—Tuning condenser drive shaft				
35334	Socket—Dial lamp socket				

First Edition

Trademark "Victor," "RCA Victor," Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

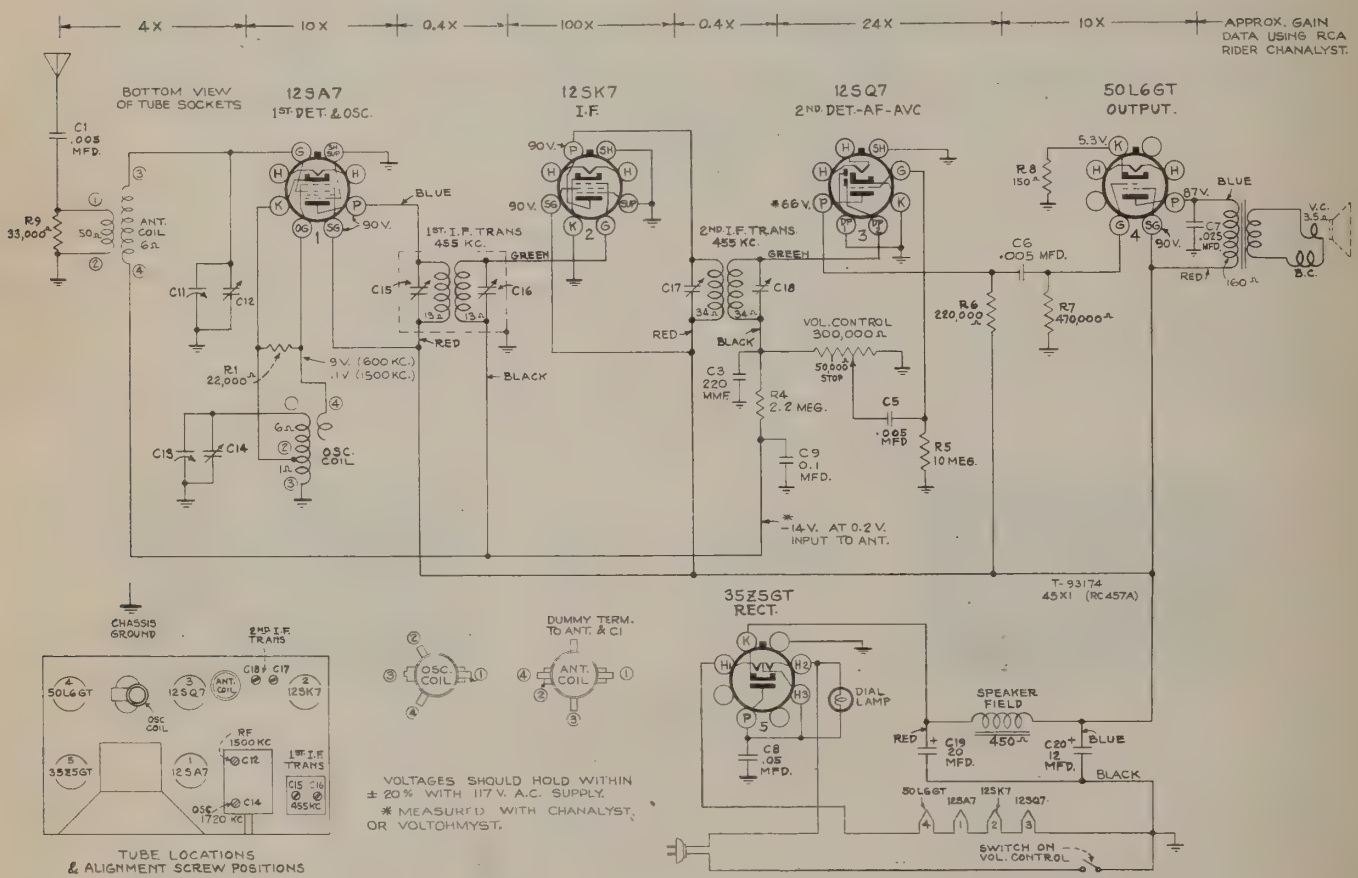
Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 grid in series with .001 mfd.	455 kc	Quiet Point at 1,600 kc end of dial	C17, C18 (2nd I-F Trans.)
2	12SA7 grid in series with .001 mfd.			C15, C16 (1st I-F Trans.)
3	Antenna term. of ant. trans. in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C14 (oscillator)
4		1,500 kc	Resonance on 1,500 kc signal	C12 (antenna)



RCA Victor

Models 45X5 and 45X6 (Chassis No. RC-457-D)

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.
A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,680 kc
Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Half-Wave Rectifier

Dial Lamp (1) ..... Mazda 51, 7.5 volts, 0.2 amp.

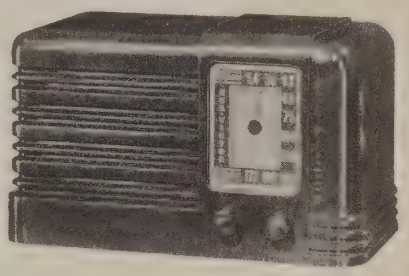
POWER SUPPLY RATINGS
A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)
Undistorted ..... 1.0 watts
Maximum ..... 1.25 watts

LOUDSPEAKER
Type ..... 4-inch Electrodynamic
Cabinet Dimensions (inches) .. Height 5-1/16, Width 8¾, Depth 4¾
Weight (net) ..... 4 pounds

Model 45X5—At Right
Walnut Finish Plastic Cabinet

Model 45X6
Ivory Finish Plastic Cabinet



Features of design include: New Type single-ended tubes (12SA7, 12SK7, and 12SQ7); edge-lighted dial; dust proof electrodynamic loudspeaker; and Beam Power Output.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-457D)		32969	Socket—Dial lamp socket	
12720	Capacitor—100 mmfd. (C22)		31319	Socket—Tube socket	
33584	Capacitor—.005 mfd. (C1, C6)		30585	Spring—Drive cord spring	
4937	Capacitor—.01 mfd. (C5)		32966	Transformer—First I-F transformer	
4870	Capacitor—.025 mfd. (C7)		34442	Transformer—Second I-F transformer	
32787	Capacitor—.05 mfd. (C8)		34373	Washer—"C" washer for tuning shaft	
4839	Capacitor—0.1 mfd. (C9)				
34505	Capacitor—0.2 mfd. (C23)			**SPEAKER ASSEMBLIES (39105-506)**	
32576	Capacitor—Electrolytic, comprising 1 section of 20 mfd. and 1 section of 12 mfd. (C19, C20)		35120	Cone—Cone, complete with voice coil	
35115	Coil—Antenna coil		35611	Speaker—4-inch dynamic speaker, complete with cone—less output transformer	
33452	Condenser—2-gang variable tuning condenser		34174	Transformer—Output transformer	
35113	Control—Volume control and power switch				
32634	Cord—Drive cord			**MISCELLANEOUS ASSEMBLIES**	
35117	Drum—Tuning condenser drive drum		35122	Back—Cabinet back for Model 45X5	
11765	Lamp—Dial lamp		35125	Back—Cabinet back for Model 45X6	
31193	Lead—Antenna lead		35124	Dial—Glass dial scale	
14439	Resistor—100 ohms, ½ watt (R12)		35123	Knob—Ivory tuning or volume control knob for Model 45X6	
30880	Resistor—150 ohms, ½ watt (R8)		35121	Knob—Walnut tuning or volume control knob for Model 45X5	
13998	Resistor—22,000 ohms, ½ watt (R1)		35126	Spring—Retaining spring for knobs, Stock Nos. 35121 and 35123	
12454	Resistor—33,000 ohms, ½ watt (R9)				
12264	Resistor—220,000 ohms, ½ watt (R6, R11)				
12285	Resistor—470,000 ohms, ½ watt (R7)				
12679	Resistor—2.2 meg., ½ watt (R4)				
13601	Resistor—10 meg., ½ watt (R5)				
35329	Shaft—Tuning shaft				

First Edition
Trademarks "Victor," "RCA Victor," Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.
Printed in U. S. A.

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For I-F alignment, connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that it is vertical.

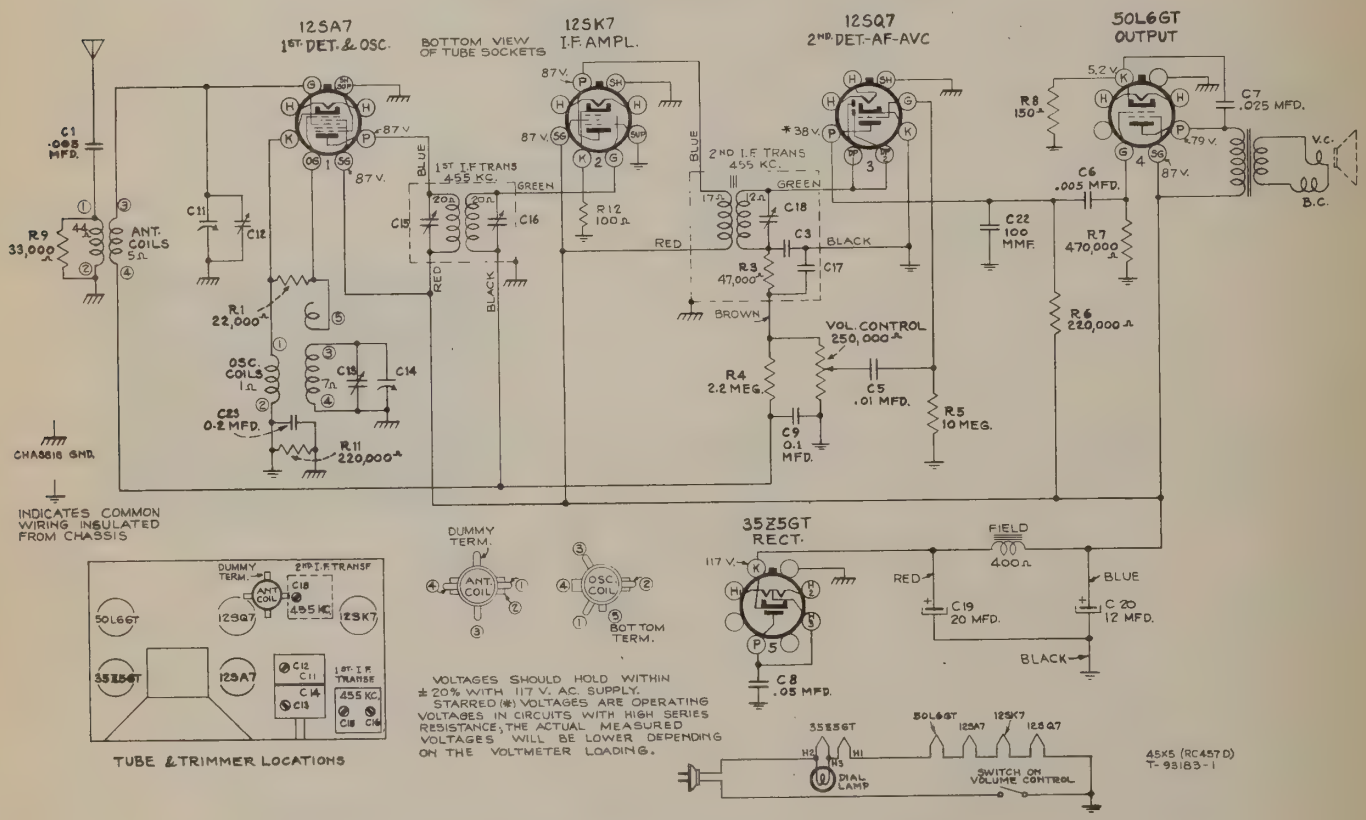
Antenna.—The set is equipped with length of antenna wire. Do not connect the antenna to ground. If an outdoor antenna is used, it should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 I-F grid in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C18 (2nd I-F trans.)
2	Tuning condenser stator (osc.) in series with .01 mfd.			C15 and C16 (1st I-F trans.)
3	Antenna term. of ant. trans. in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C13 (oscillator)
4		1,400 kc	Resonance on 1,400 kc signal	C12 (antenna)

Precautionary Lead Dress

1. Green and blue leads from 1st I.F. transformer should be dressed apart and against chassis.
2. Blue lead of the 2nd I.F. transformer must be dressed against the shield and down between the tube socket and chassis.
3. Dress green diode lead away from 12SQ7 grid resistor and condenser.



Schematic Circuit Diagram

RCA Victor

Models 45X11, 45X12 (Chassis No. RC-459)

Model 45X13 (Chassis No. RC-459A)

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 54 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,600 kc

Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Rectifier
Dial Lamp (1) ..... Mazda 51, 7.5 volts, .2 amp.

POWER SUPPLY RATINGS

A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

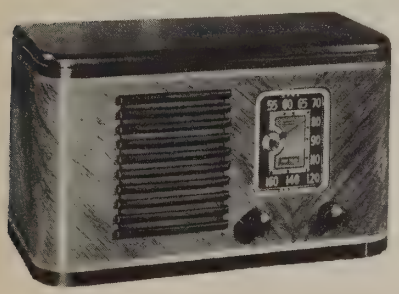
POWER OUTPUT (125 volt, 60 cycle supply)

Undistorted ..... 1.0 watts
Maximum ..... 1.5 watts

LOUDSPEAKER

Type ..... 5-inch Electrodynamic

General Description



Model 45X13

Model	Description	Cabinet Dimensions Height	Width	Depth
45X11	Molded Mahogany plastic cabinet	6 19/32	9 25/32	5⅞
45X12	Molded Antique-ivory plastic cabinet	6 19/32	9 25/32	5⅞
45X13	Walnut cabinet	8⅛	13⅛	6 5/16

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-459) (RC-459A)		35057	Control—Volume control and power switch	
			32634	Cord—Tuning condenser drive cord	
			35063	Drum—Tuning condenser drive drum	
13057	Capacitor—68 mmfd. (C5)		35062	Indicator—Station selector indicator	
12694	Capacitor—220 mmfd. (C11, C13)		11765	Lamp—Dial lamp	
33584	Capacitor—.005 mfd. (C14)		35061	Loop—Antenna loop complete	
4937	Capacitor—.01 mfd. (C15, C16)		12071	Resistor—120 ohms, ½ watt (R13)	
11315	Capacitor—.015 mfd. (C17) (RC-459A)		32535	Resistor—120 ohms, ½ watt (R9)	
30938	Capacitor—.025 mfd. (C17) (RC-459)		13998	Resistor—22,000 ohms, ½ watt (R1)	
32787	Capacitor—.05 mfd. (C12)		12412	Resistor—47,000 ohms, ½ watt (R3)	
32576	Capacitor—Electrolytic comprising 1 section of 20 mfd. and 1 section of 12 mfd.		12264	Resistor—220,000 ohms, ½ watt (R7)	
			12285	Resistor—470,000 ohms, ½ watt (R8)	
34443	Coil—Oscillator coil		12679	Resistor—2.2 megohms, ½ watt (R4)	
35053	Condenser—Variable tuning condenser less drive drum		13601	Resistor—10 megohms, ½ watt (R6)	
			35059	Scale—Dial scale	

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Printed in U. S. A.

Replacement Parts (Continued)

STOCK No.	DESCRIPTION
35058	Shaft—Tuning condenser drive shaft
34449	Socket—Dial lamp socket
31319	Socket—Tube socket
30585	Spring—Drive cord tension spring
35056	Transformer—Output transformer
35054	Transformer—1st I.F. transformer
35055	Transformer—2nd I.F. transformer
	SPEAKER ASSEMBLIES (39223-2)
35065	Cone—Cone complete with voice coil
	SPEAKER ASSEMBLIES (RL 86-2)
32907	Cap—Dust cap
35066	Cone—Cone complete with voice coil
34450	Speaker—5-inch dynamic speaker complete with cone and voice coil less output transformer
	MISCELLANEOUS ASSEMBLIES
35068	Back—Cabinet back for Model 45X11
35070	Back—Cabinet back for Model 45X12
35072	Back—Cabinet back for Model 45X13
35079	Crystal—Dial scale crystal for Models 45X11, 45X12
35067	Crystal—Dial scale crystal for Model 45X13
35069	Fastener—1 set Push Fastener for crystal on Models 45X11, 45X12
35078	Knob—Light mahogany tuning or volume control knob for Model 45X11
35071	Knob—Ivory tuning or volume control knob Model 45X12
30863	Knob—Walnut tuning or volume control knob Model 45X13
30900	Spring—Retaining spring for knobs Stock No. 30863, 35071 and 35078

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that pointer is vertical.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

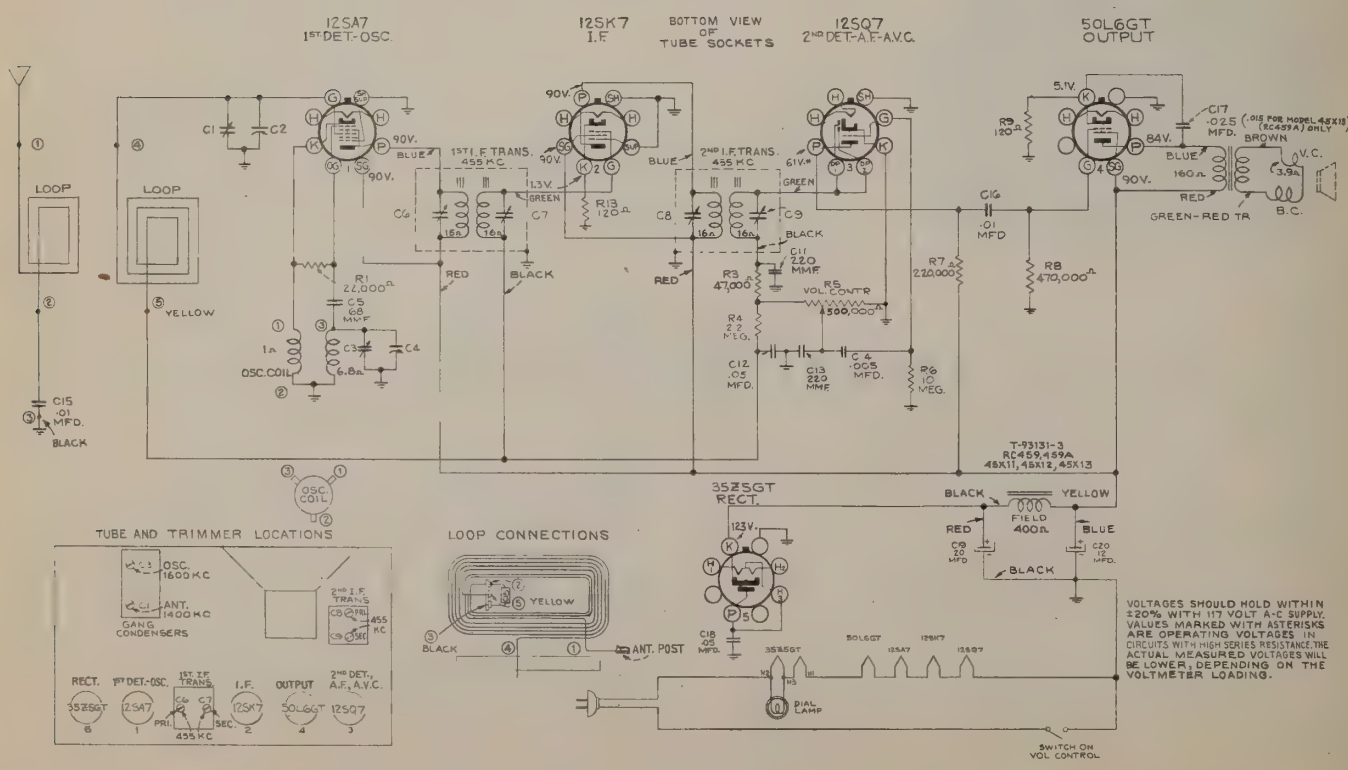
Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 (I-F) grid in series with .01 mfd.	455 kc	Quiet point at 600 kc end of dial	C8, C9 (2nd I-F trans.)
2	Tuning condenser stator (ant.) in series with .01 mfd.			C6, C7 (1st I-F trans.)
3	Radiation loop consisting of two turns of wire 18 inches in diameter	1,600 kc	Full clockwise (out of mesh)	C3 (oscillator)
4		1,400 kc	Resonance on 1,400 kc signal	C1 (antenna)

Precautionary Lead Dress

1. Audio coupling capacitor to volume control must be dressed under the terminal board and down against the corner of the chassis.

2. The voice coil leads from the output transformer to the speaker must be dressed away from the terminal on the terminal-board to which the above audio coupling capacitor is connected.

3. The output tube bypass condenser must be dressed away from the 12SQ7 tube.



RCA Victor

Models 45X-11, 45X-12, 45X-13, Second Production

Chassis No. RC-459D RC-459D RC-459E

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

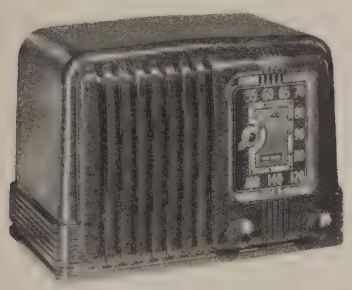
FREQUENCY RANGE ..... 530-1,600 kc
Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT
(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Rectifier
Dial Lamp (1) ..... Mazda 51, 7.5 volts, .2 amp.

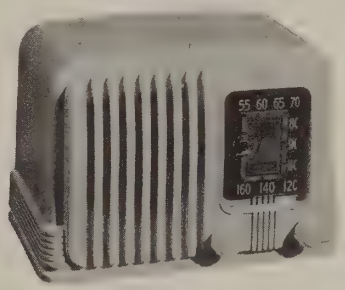
POWER SUPPLY RATINGS
A-C Rating ..... 105-125 volts, 50-60 cycles, 50 watts
D-C Rating ..... 105-125 volts, direct current, 50 watts

POWER OUTPUT (117 volt, 60 cycle supply) ..... 1.0 watt

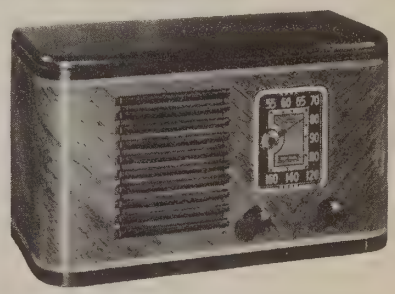
LOUDSPEAKER
Type ..... 5-inch Electrodynamic



Model 45X-11



Model 45X-12



Model 45X-13

Height	6⅝	6⅝	8⅛ Inches
Width	9¾	9¾	13⅛ Inches
Depth	5⅞	5⅞	6 5/16 Inches

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES Model 45X-11, RC-459D Model 45X-12, RC-459D Model 45X-13, RC-459E
35097	Can—Shield can for I-F transformers, Stock Nos. 35346, 35347
12694	Capacitor—220 mmfd. (C11, C13)
33584	Capacitor—.005 mfd. (C16)
4937	Capacitor—.01 mfd. (C15)
11315	Capacitor—.015 mfd. (C14) (C17 for Model 45X-13)
30938	Capacitor—.025 mfd. (C17 for Models 45X-11, 45X-12)
32787	Capacitor—.05 mfd. (C12, C18)
35348	Capacitor—Electrolytic, comprising 1 section of 30 mfd. and 1 section of 20 mfd. (C19, C20).
35579	Coil—Oscillator coil
35534	Condenser—Variable tuning condenser
35344	Control—Volume control and power switch
32634	Cord—Tuning condenser drive cord
35059	Dial—Dial scale
35063	Drum—Tuning condenser drive drum
35062	Indicator—Station selector indicator
11765	Lamp—Dial lamp
35061	Loop—Antenna loop complete
14439	Resistor—100 ohms, ½ watt (R13) (45X-13)
35993	Plate—Dial scale mounting plate
30189	Resistor—120 ohms, ½ watt (R9)
13428	Resistor—150 ohms, ½ watt (R13) (45X-11, -12)
13998	Resistor—22,000 ohms, ½ watt (R1)
13715	Resistor—68,000 ohms, ½ watt (R15)
12264	Resistor—220,000 ohms, ½ watt (R7)
12285	Resistor—470,000 ohms, ½ watt (R8)
12679	Resistor—2.2 meg., ½ watt (R4)
13601	Resistor—10 meg., ½ watt (R6)
35343	Shaft—Tuning condenser drive shaft
35345	Socket—Dial lamp socket
31251	Socket—Tube socket
31418	Spring—Drive cord spring
35098	Spring—Spring to hold I-F transformers in can
35346	Transformer—First I-F transformer—less shield can
35347	Transformer—Second I-F transformer—less shield can
35056	Transformer—Output transformer
34373	Washer—"C" washer for tuning shaft
	SPEAKER ASSEMBLIES (39223-502)
35065	Cone—Cone complete with voice coil

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	SPEAKER ASSEMBLIES (RL86-2)		35067	Escutcheon—Dial scale escutcheon and crystal for Model 45X-13	
32907	Cap—Dust cap		33317	Fastener—Push-on fastener for cabinet back for Models 45X-11, 45X-12	
35066	Cone—Cone complete with voice coil		35069	Fastener—Push-on fastener for crystal for Models 45X-11, 45X-12	
34450	Speaker—5-inch dynamic speaker complete with cone and voice coil—less output transformer		35071	Knob—Ivory tuning or volume control knob for Model 45X-12	
	MISCELLANEOUS ASSEMBLIES		35078	Knob—Light mahogany tuning or volume control knob for Model 45X-11	
35068	Back—Cabinet back for Model 45X-11		30863	Knob—Walnut tuning or volume control knob for Model 45X-13	
35070	Back—Cabinet back for Model 45X-12		30900	Spring—Retaining spring for knobs, Stock Nos. 30863, 35071, 35078	
35072	Back—Cabinet back for Model 45X-13				
35079	Escutcheon—Dial scale escutcheon and crystal for Models 45X-11, 45X-12				

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

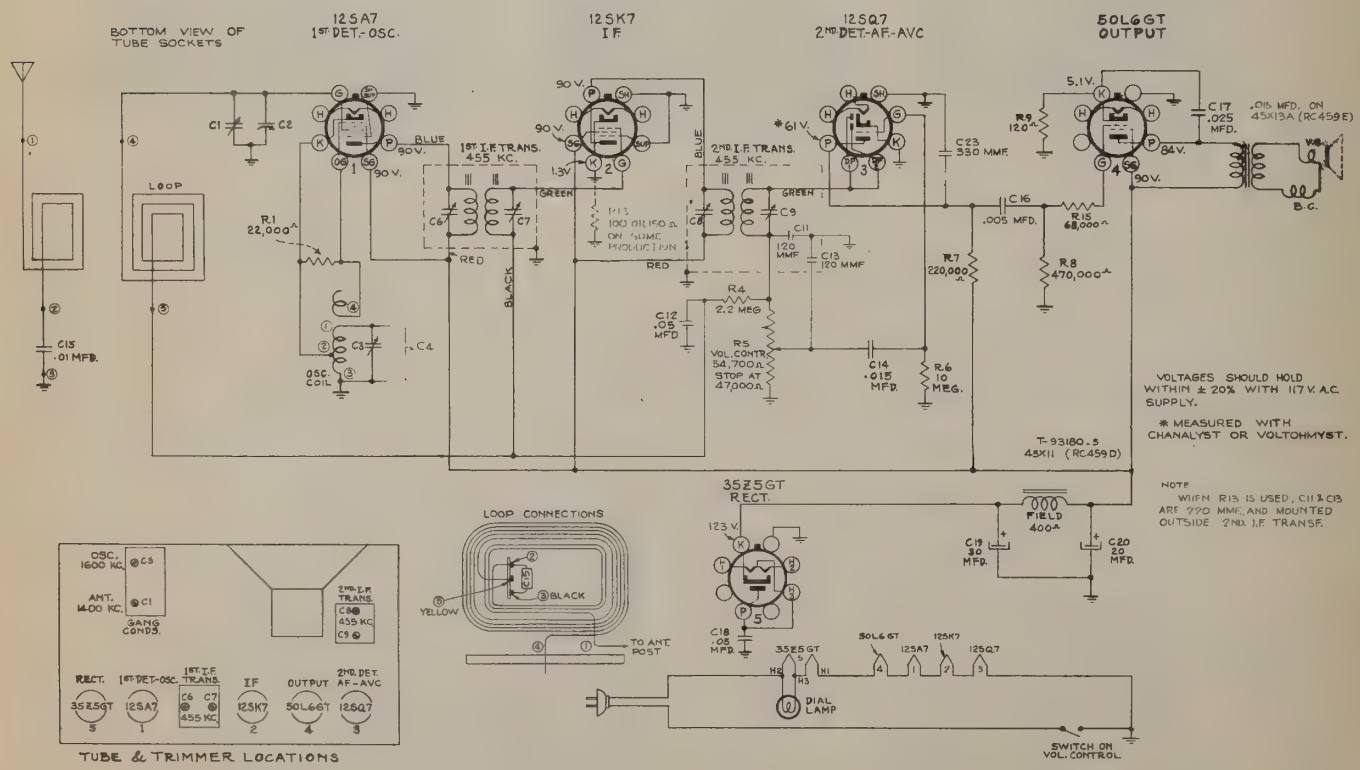
Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that pointer is vertical.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity. — For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 (I-F) grid in series with .01 mfd.	455 kc	Quiet point at 600 kc end of dial	C8, C9 (2nd I-F trans.)
2	Tuning condenser stator (ant.) in series with .01 mfd.			C6, C7 (1st I-F trans.)
3	Radiation loop consisting of two turns of wire 18 inches in diameter	1,600 kc	Full clockwise (out of mesh)	C3 (oscillator)
4		1,400 kc	Resonance on 1,400 kc signal	C1 (antenna)



RCA Victor

Models 45X111, 45X112 and 45X113

Chassis Nos. 459J and 459K

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver with Built-in Loop Antenna

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 550-1,600 kc

Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7 ..... 1st-Detector—Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Rectifier

Dial Lamp (1) ..... Mazda 51, 7.5 volts, .20 amp.

POWER SUPPLY RATINGS

A-C Rating ..... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ..... 105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)

Undistorted ..... .8 watts
Maximum ..... 1.3 watts

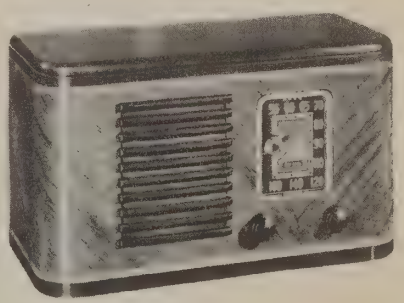
LOUDSPEAKER

Type ..... 5-inch electrodynamic

Model	Weight (shipping)	Description	Cabinet Dimensions (inches)
45X111	8½ lbs.	Mahogany plastic finish	6 19/32 x 9 25/32 x 5⅞
45X112	8½ lbs.	Antique-ivory plastic finish	6 19/32 x 9 25/32 x 5⅞
45X113	10 lbs.	Walnut finish	8⅛ x 13⅛ x 6 5/16

At Right—

Model 45X113



Features of design include: New type single-ended tubes (12SA7, 12SK7, and 12SQ7); clock-type dial; dust-proofed electrodynamic loudspeaker; "Magic Loop"; and Beam Power Output.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES		35571	Coil—Oscillator coil	
	MODEL 45X111 } RC-459J		35534	Condenser—Variable tuning condenser	
	MODEL 45X112 }		35344	Control—Volume control and power switch	
	MODEL 45X113—RC-459K		32634	Cord—Drive cord	
			35059	Dial—Dial scale	
35097	Can—Shield can for transformers—Stock Nos. 35346 and 35347		35063	Drum—Drive drum	
			35062	Indicator—Station selector indicator	
12694	Capacitor—220 mmfd. (C11, C13, C22)		11765	Lamp—Dial lamp	
33640	Capacitor—.005 mfd. (C16)		35061	Loop—Antenna loop	
4937	Capacitor—.01 mfd. (C15)		30189	Resistor—120 ohms, ½ watt (R9)	
11315	Capacitor—.015 mfd. (C14) (C17 for Model 45X113)		14561	Resistor—220 ohms, ½ watt (R13)	
			13998	Resistor—22,000 ohms, ½ watt (R1)	
30938	Capacitor—.025 mfd. (C17 for Models 45X111, 45X112)		12264	Resistor—220,000 ohms, ½ watt (R2, R7)	
			12285	Resistor—470,000 ohms, ½ watt (R8)	
32787	Capacitor—.05 mfd. (C12, C18, C21)		12679	Resistor—2.2 meg., ½ watt (R4)	
12484	Capacitor—0.25 mfd. (C6)		13601	Resistor—10 meg., ½ watt (R6)	
35348	Capacitor—Electrolytic, comprising 1 section of 30 mfd., and 1 section of 20 mfd.		35343	Shaft—Drive shaft	
			34449	Socket—Dial lamp socket	

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Printed in U. S. A.

Replacement Parts (Continued)

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
31251	Socket—Tube socket
31418	Spring—Drive cord spring
35098	Spring—Retaining spring for transformers—Stock Nos. 35346 and 35347
35056	Transformer—Audio transformer
35346	Transformer—First I-F transformer—less shield can
35347	Transformer—Second I-F transformer
34373	Washer—"C" washer for drive shaft
	SPEAKER ASSEMBLIES (39223-502)
35065	Cone—Cone complete with voice coil
	SPEAKER ASSEMBLIES (RL-86-2)
32907	Cap—Dust cap
35066	Cone—Cone complete with voice coil
34450	Speaker—5-inch dynamic speaker complete with cone and voice coil—less output transformer

STOCK No.	DESCRIPTION
	MISCELLANEOUS ASSEMBLIES
35068	Back—Cabinet back for Model 45X111
35070	Back—Cabinet back for Model 45X112
35072	Back—Cabinet back for Model 45X113
35067	Crystal—Station selector crystal for Model 45X113
33317	Fastener—Push fastener to hold backs—Stock Nos. 35068 and 35070
35069	Fastener—Push fastener to hold crystal—Stock No. 35067
35071	Knob—Ivory tuning or volume control knob for Model 45X112
35078	Knob—Light mahogany tuning or volume control knob for Model 45X111
30863	Knob—Walnut tuning or volume control knob for Model 45X113
30900	Spring—Retaining spring for knobs—Stock Nos. 35071, 35078, 30863

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For I-F alignment, connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that it is vertical.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

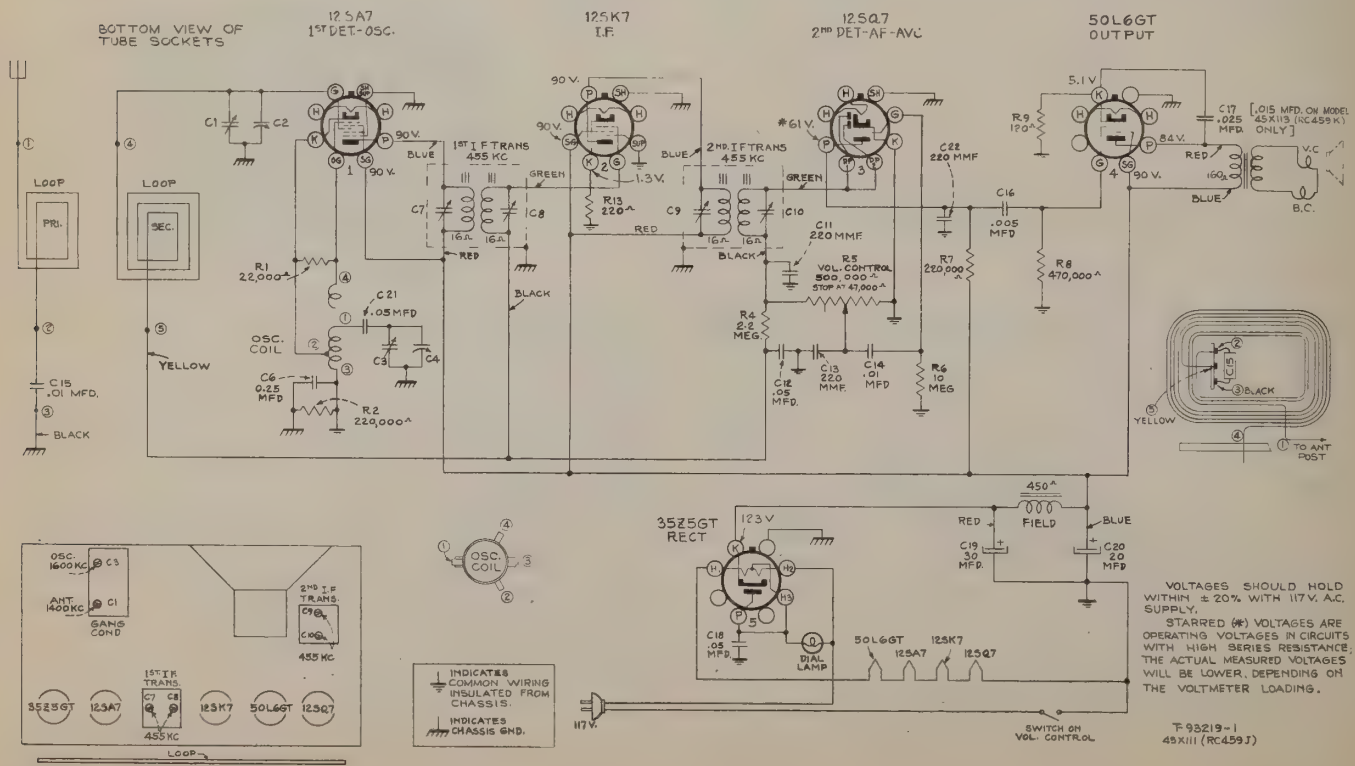
Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 I-F grid in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C9 and C10 (2nd I-F trans.)
2	Tuning condenser stator (osc.) in series with .01 mfd.			C7 and C8 (1st I-F trans.)
3	Radiation loop consisting of two turns of wire 18 inches in diameter	1,600 kc	Full clockwise (out of mesh)	C3 (oscillator)
4		1,400 kc	Resonance on 1,400 kc signal	C1 (antenna)

Precautionary Lead Dress

1. Dress grid lead of 12SK7 close to chassis under condenser (C12).

2. Dress green and blue leads from i-f transformers close to chassis and away from each other.

3. Dress leads from terminal board on loop support away from loop.



RCA Victor

Models 46X1, 46X2 and 46X3

Chassis Nos. 459B and 459C

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver with Built-in Loop Antenna

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 55 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,600 kc

Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Rectifier
Dial Lamp (1) ..... Mazda 47, 6.3 volts, .15 amp.

POWER SUPPLY RATINGS

A-C Rating ..... 105-125 volts, 50-60 cycles, 50 watts
D-C Rating ..... 105-125 volts, direct current, 50 watts

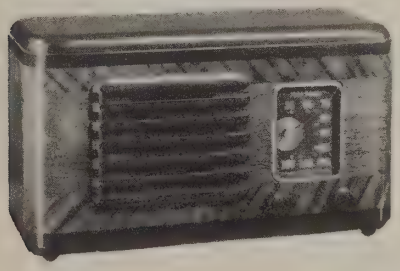
POWER OUTPUT (125 volt, 60 cycle supply)

Undistorted ..... .6 watts
Maximum ..... 2.0 watts

LOUDSPEAKER

Type ..... 5-inch electrodynamic

Model	Weight (shipping)	Description	Cabinet Dimensions (inches)
46X1	8¾ lbs.	Mahogany plastic finish	6 19/32 x 9 25/32 x 5⅞
46X2	8¾ lbs.	Antique-ivory plastic finish	6 19/32 x 9 25/32 x 5⅞
46X3	13½ lbs.	Walnut finish	8 5/16 x 14½ x 7 7/16



At Left—
Model 46X3

Features of design include: New type single-ended tubes (12SA7, 12SK7, and 12SQ7); clock-type dial; dust-proof electrodynamic loudspeaker; "Magic Loop"; and Beam Power Output.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-459B and RC-459C)		31480	Lamp—Dial lamp	
35000	Ballast—Ballast tube resistor		35061	Loop—Antenna loop complete	
13057	Capacitor—68 mmfd. (C5)		12071	Resistor—120 ohms, ½ watt (R13)	
12694	Capacitor—220 mmfd. (C11, C13)		32535	Resistor—120 ohms, ½ watt (R9)	
33584	Capacitor—.005 mfd. (C14)		13998	Resistor—22,000 ohms, ½ watt (R1)	
4937	Capacitor—.01 mfd. (C15, C16)		12412	Resistor—47,000 ohms, ½ watt (R3)	
11315	Capacitor—.015 mfd. (C17)		11281	Resistor—100,000 ohms, 1/10 watt (R15)	
30938	Capacitor—.025 mfd. (C17)		12264	Resistor—220,000 ohms, ½ watt (R2)	
32787	Capacitor—.05 mfd. (C12, C18)		12285	Resistor—470,000 ohms, ½ watt (R8)	
34505	Capacitor—.2 mfd. (C21)		12679	Resistor—2.2 megohms, ½ watt (R4)	
12484	Capacitor—0.25 mfd. (C6)		13601	Resistor—10 megohms, ½ watt (R6)	
35064	Capacitor—Electrolytic comprising 1 section of 20 mfd. and 1 section of 12 mfd		35000	Resistor—Ballast tube resistor	
34443	Coil—Oscillator coil		35060	Scale—Dial scale	
35053	Condenser—Variable tuning condenser *less drive drum*		35058	Shaft—Tuning condenser drive shaft	
35057	Control—Volume control and power switch		34449	Socket—Dial lamp socket	
32634	Cord—Tuning condenser drive cord		31319	Socket—Tube socket	
35063	Drum—Tuning condenser drive drum		30585	Spring—Drive cord tension spring	
35062	Indicator—Station selector indicator		35056	Transformer—Output transformer	
			35054	Transformer—1st I.F. transformer	
			35055	Transformer—2nd I.F. transformer	
			35000	Tube—Ballast tube resistor	

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	SPEAKER ASSEMBLIES (39223-2)		35070	Back—Cabinet back for Model 46X2	
35065	Cone—Cone complete with voice coil		35077	Back—Cabinet back for Model 46X3	
34174	Transformer—Output transformer		35079	Crystal—Dial scale crystal for Models 46X1 and 46X2	
	SPEAKER ASSEMBLIES (RL 86-5)		35067	Crystal—Dial scale crystal for Model 46X3	
32907	Cap—Dust cap		35069	Fastener—1 set Push Fastener for crystal on Models 46X1 and 46X2	
35066	Cone—Cone complete with voice coil		35074	Knob—Ivory tuning or volume control knob for Model 46X2	
34450	Speaker 5" dynamic speaker complete with cone and voice coil less output transformer		35073	Knob—Light mahogany tuning or volume control knob for Model 46X1	
	MISCELLANEOUS ASSEMBLIES (RR 574)		35075	Knob—Light walnut tuning or volume control knob for Model 46X3	
35068	Back—Cabinet back for Model 46X1		35076	Spring—Retaining spring for knobs Stock No. 35073, 35074 and 35075	

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For I-F alignment, connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that it is vertical.

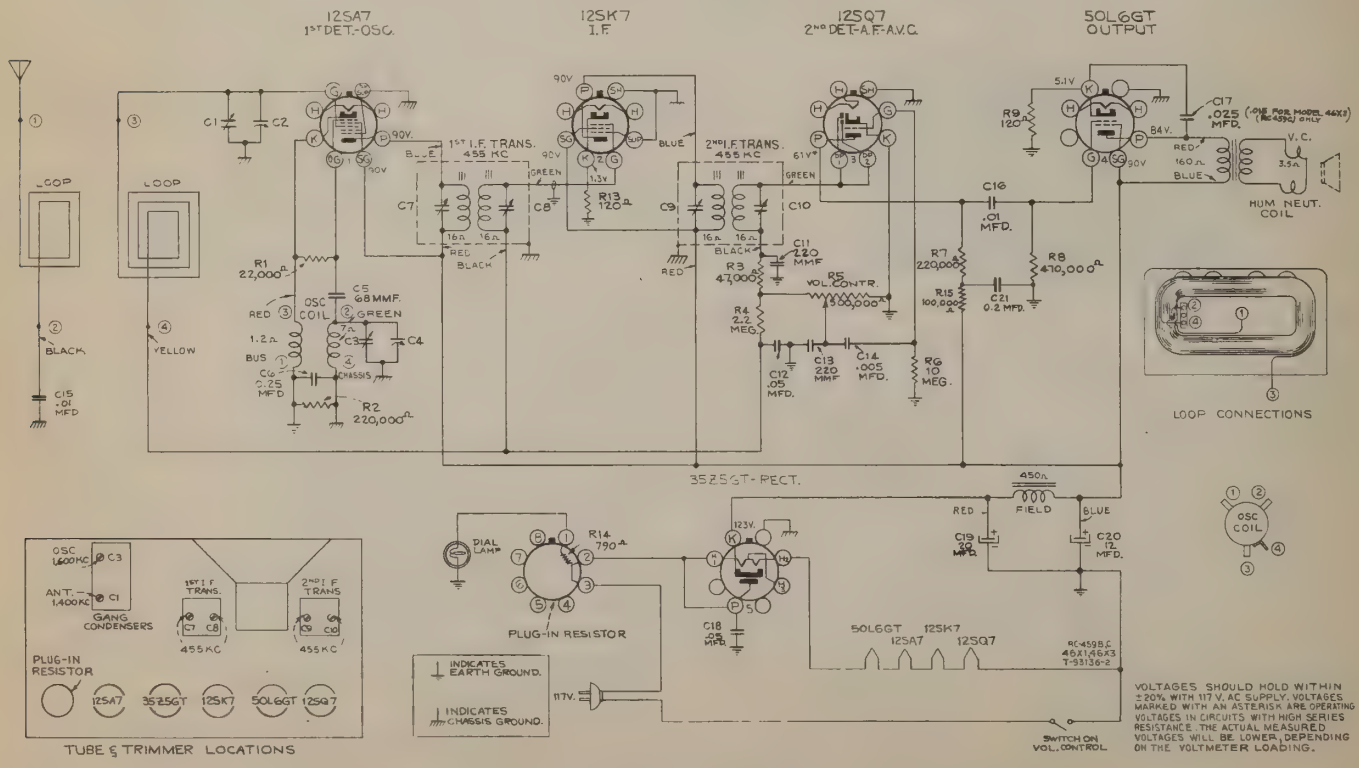
Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 I-F grid in series with .01 mfd.	455 kc		C9 and C10 (2nd I-F trans.)
2	Tuning condenser stator (osc.) in series with .01 mfd.			C7 and C8 (1st I-F trans.)
3	Radiation loop consisting of two turns of wire 18 inches in diameter	1,600 kc	Full clockwise (out of mesh)	C3 (oscillator)
4		1,400 kc	Resonance on 1,400 kc signal	C1 (antenna)

Precautionary Lead Dress

1. Dress grid lead of 12SK7 close to chassis under condenser (C12).
2. Dress green and blue leads from i-f transformers close to chassis and away from each other.
3. Dress leads from terminal board on loop support away from loop.


12SA7 1ST DET.-OSC.
12SK7 I.F.
12SQ7 2ND DET.-A.F.-A.V.C.
50L6GT OUTPUT
1ST I.F. TRANS. 455 KC
2ND I.F. TRANS. 455 KC
LOOP
LOOP CONNECTIONS
HUM NEUT. COIL
OSC COIL
3525GT-RECT.
PLUG-IN RESISTOR
DIAL LAMP
FIELD
INDICATES EARTH GROUND.
INDICATES CHASSIS GROUND.
SWITCH ON VOL. CONTROL
TUBE & TRIMMER LOCATIONS
GANG CONDENSERS
PLUG-IN RESISTOR
VOLTAGES SHOULD HOLD WITHIN ±20% WITH 117 V. AC SUPPLY. VOLTAGES MARKED WITH AN ASTERISK ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE. THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.

Schematic Circuit Diagram

In some instruments R13 is 150 ohms.

RCA Victor

Models 46X-1, 46X-2, and 46X-3, 2nd Production

Chassis Nos. RC-459F RC-459F and RC-459H

Five-Tube, Single-Band, AC-DC, Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 530-1,600 kc

Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7 ..... 1st-Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Rectifier

Dial Lamp (1) ..... Mazda 47, 6.3 volts, .15 amp.

POWER SUPPLY RATINGS

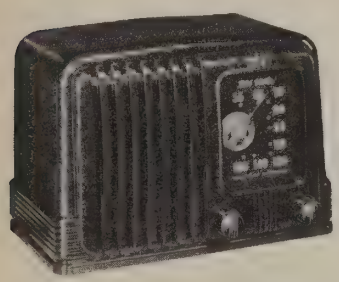
A-C Rating ..... 105-125 volts, 50-60 cycles, 65 watts
D-C Rating ..... 105-125 volts, direct current, 65 watts

POWER OUTPUT (117 volt, 60 cycle supply) ..... 1.0 watt

LOUDSPEAKER

Type ..... 5-inch electrodynamic

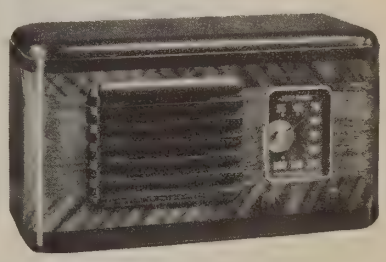
Model	Weight (shipping)	Description	Cabinet Dimensions (inches)
46X1	8¾ lbs.	Mahogany plastic finish	6⅝ x 9¾ x 5⅞
46X2	8¾ lbs.	Antique-ivory plastic finish	6⅝ x 9¾ x 5⅞
46X3	13½ lbs.	Walnut finish	8 5/16 x 14½ x 7 7/16



Model 46X-1
Mahogany

Model 46X-2
Ivory

Model 46X-3



Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES Model 46X-1, RC-459F Model 46X-2, RC-459F Model 46X-3, RC-459H		35063	Drum—Tuning condenser drive drum	
35000	Ballast—Ballast tube resistor		35062	Indicator—Station selector indicator	
35097	Can—Shield can for I-F transformers Stock No. 35346, 35347		31480	Lamp—Dial lamp	
12694	Capacitor—220 mmfd. (C11, C13)		35061	Loop—Antenna loop complete	
33584	Capacitor—.005 mfd. (C16)		35993	Plate—Dial scale mounting plate	
4937	Capacitor—.01 mfd. (C15)		35000	Resistor—Ballast tube resistor	
11315	Capacitor—.015 mfd. (C14) (C17 for Model 46X-3)		30189	Resistor—120 ohms, ½ watt (R9)	
30938	Capacitor—.025 mfd. (C17 for Models 46X-1, 46X-2)		14561	Resistor—220 ohms, ½ watt (R13)	
32787	Capacitor—.05 mfd. (C12, C18, C21)		13998	Resistor—22,000 ohms, ½ watt (R1)	
12484	Capacitor—.25 mfd. (C6)		13715	Resistor—68,000 ohms, ½ watt (R15)	
35348	Capacitor—Electrolytic, comprising 1 section of 30 mfd., and 1 section of 20 mfd. (C19, and C20)		12264	Resistor—220,000 ohms, ½ watt (R2, R7)	
35571	Coil—Oscillator coil		12285	Resistor—470,000 ohms, ½ watt (R8)	
35534	Condenser—Variable tuning condenser		12679	Resistor—2.2 megs., ½ watt (R4)	
35344	Control—Volume control and power switch		13601	Resistor—10 megs., ½ watt (R6)	
32634	Cord—Tuning condenser drive cord		35343	Shaft—Tuning condenser drive shaft	
35060	Dial—Dial scale		34449	Socket—Dial lamp socket	
			31251	Socket—Tube socket	
			31418	Spring—Drive cord spring	
			35098	Spring—Spring to hold I-F transformers in can	
			35346	Transformer—First I-F transformer—less shield can	
			35347	Transformer—Second I-F transformer—less shield can	
			35056	Transformer—Output transformer	
			35000	Tube—Ballast tube resistor	
			34373	Washer—"C" washer for tuning shaft	

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	SPEAKER ASSEMBLIES (39223-2)		35077	Back—Cabinet back for 46X-3	
35065	Cone—Cone complete with voice coil		35079	Escutcheon—Dial scale escutcheon and crystal for 46X-1 and 46X-2	
	SPEAKER ASSEMBLIES (RL-86-2)		35067	Escutcheon—Dial scale escutcheon and crystal for 46X-3	
32907	Cap—Dust cap		33317	Fastener—Push-on fastener for cabinet back, 46X-1, 46X-2	
35066	Cone—Cone complete with voice coil		35069	Fastener—Push-on fastener for crystal, 46X-1, 46X-2	
34450	Speaker—5 in. dynamic speaker complete with cone and voice coil, less output transformer		35074	Knob—Ivory tuning or volume control knob, 46X-2	
	MISCELLANEOUS ASSEMBLIES		35073	Knob—Light mahogany tuning or volume control knob, 46X-1	
35068	Back—Cabinet back for 46X-1		35075	Knob—Light walnut tuning or volume control knob, 46X-3	
35070	Back—Cabinet back for 46X-2		35076	Spring—Retaining spring for knobs, Stock Nos. 35073, 35074, 35075	

Alignment Procedure

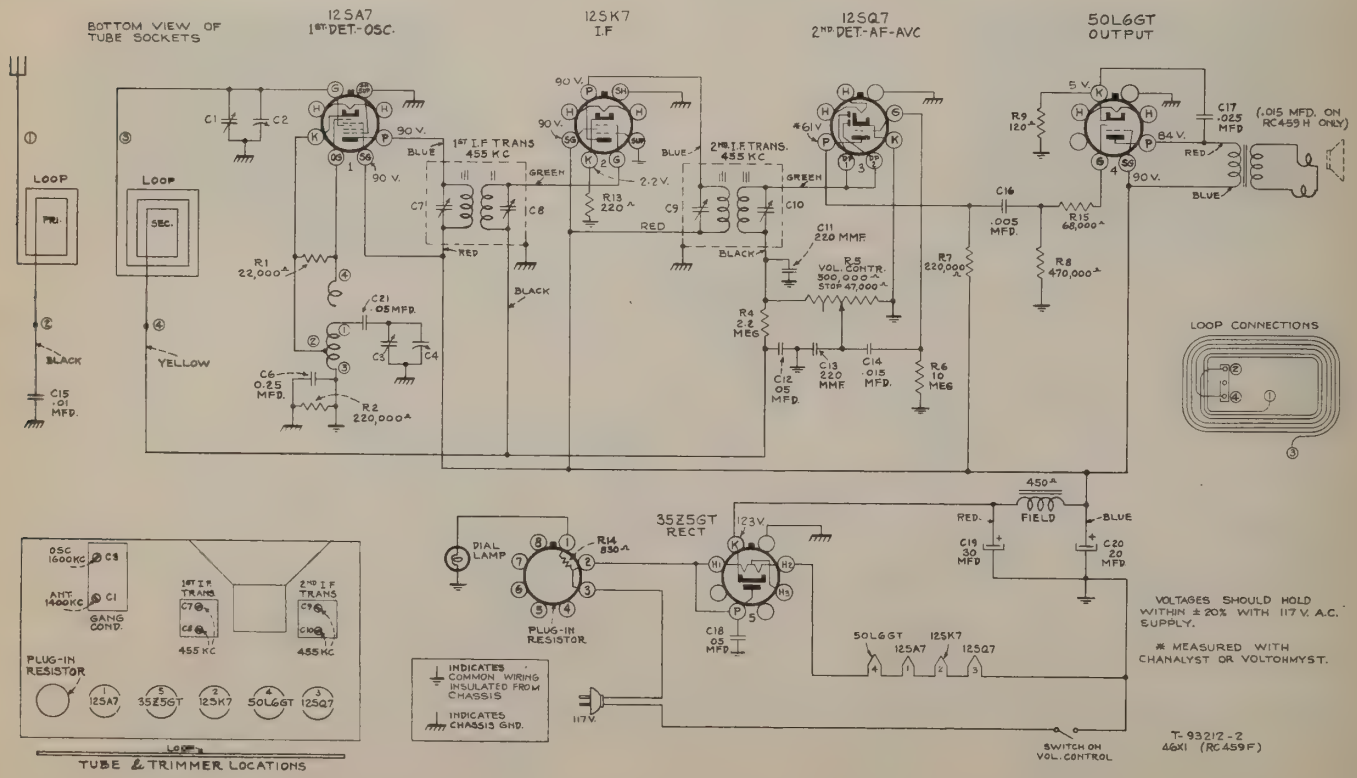
Output Meter Alignment. — Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator. — For I-F alignment, connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that it is vertical.

Antenna. — The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 I-F grid in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C9 and C10 (2nd I-F trans.)
2	Tuning condenser stator (osc.) in series with .01 mfd.			C7 and C8 (1st I-F trans.)
3	Radiation loop consisting of two turns of wire 18 inches in diameter	1,600 kc	Full Clockwise (out of mesh)	C3 (oscillator)
4		1,400 kc	Resonance on 1,400 kc signal	C1 (antenna)



RCA Victor

Models 46X11, 46X12, and 46X13

Chassis Nos. RC456 and RC456A

Five-Tube, Two-Band, AC-DC Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 56—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast ..... 540-1,600 kc
Medium Wave ..... 2.3-6.3 mc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7 ..... 1st Detector—Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... 2nd Detector, A.V.C., and A-F Amplifier
(4) RCA-50L6GT ..... Power Output
(5) RCA-35Z5GT ..... Rectifier
Dial Lamp (1) ..... Mazda 47, 6.3 volts, .15 amp.

POWER OUTPUT RATING

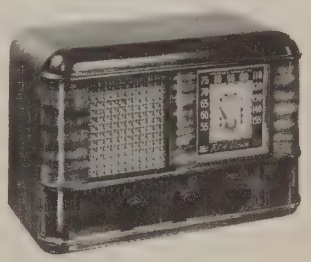
Undistorted ..... 1 watt
Maximum ..... 2 watts

LOUDSPEAKER

Type ..... 5-inch electrodynamic
V.C. Impedance ..... 4 ohms at 400 cycles

POWER SUPPLY RATINGS

A-C Rating ..... 105-125 volts, 50-60 cycles, 50 watts
D-C Rating ..... 105-125 volts, direct current, 50 watts



Model 46X13

Model	Cabinet Description	Cabinet Dimensions (inches)	Shipping Weight (lbs.)
46X11	Mahogany Plastic	8 x 12 x 7	11½
46X12	Antique-Ivory Plastic	8 x 12 x 7	11½
46X13	Walnut Veneer	9-5/16 x 13½ x 7-3/16	13½

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES Model 46X11 (RC-456) Model 46X12 (RC-456) Model 46X13 (RC-456A)		35086	Control—Volume control and power switch	
35000	Ballast—Ballast tube resistor		32634	Cord—Drive cord	
34025	Board—Antenna terminal board		35093	Dial—Dial scale	
35084	Bracket—Tuning condenser mounting bracket with bearing bushing for tuning shaft		35083	Drum—Tuning condenser drive drum	
32830	Capacitor—Mica trimmer comprising 2 sections of 2-20 mmfd. (C3, C16)		35091	Indicator—Station selector indicator	
13200	Capacitor—10 mmfd. (C10)		31480	Lamp—Dial lamp	
12724	Capacitor—120 mmfd. (C18, C21)		35095	Loop—Antenna loop complete	
31870	Capacitor—415 mmfd. (C15)		35092	Plate—Dial plate—less dial scale	
35099	Capacitor—2,100 mmfd. (C7)		35000	Resistor—Ballast tube resistor	
33584	Capacitor—.005 mfd. (C22)		30936	Resistor—120 ohms, 1 watt (R9)	
4937	Capacitor—.01 mfd. (C2, C11, C23, C28)		13428	Resistor—150 ohms, ½ watt (R4)	
4870	Capacitor—.025 mfd. (C24)		13998	Resistor—22,000 ohms, ½ watt (R2, R3, R6)	
32787	Capacitor—.05 mfd. (C17, C27)		14560	Resistor—100,000 ohms, ½ watt (R13)	
34505	Capacitor—0.2 mfd. (C4, C29)		12264	Resistor—220,000 ohms, ½ watt (R1, R8)	
32576	Capacitor—Electrolytic, comprising 1 section of 20 mfd., and 1 section of 12 mfd. (C25, C26)		12285	Resistor—470,000 ohms, ½ watt (R10)	
			12679	Resistor—2.2 meg., ½ watt (R5)	
35090	Coil—Antenna coil—"B" band (L1, L2)		13601	Resistor—10 meg., ½ watt (R7)	
35096	Coil—Loop loading coil (L3)		35085	Shaft—Tuning condenser drive shaft	
35251	Coil—Oscillator coil—"B" band (L6)		35094	Socket—Dial lamp socket	
35082	Condenser—Variable tuning condenser—less drum		31319	Socket—Tube socket	
			30585	Spring—Drive cord tension spring	
			35087	Switch—Range switch	
			35054	Transformer—First I-F transformer	
			35055	Transformer—Second I-F transformer	
			35056	Transformer—Output transformer	
			35000	Tube—Ballast tube resistor	

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Replacement Parts (Continued)

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES
32907	Cap—Dust cap
35066	Cone—Cone complete with voice coil (For Spkr. No. RL86-4)
35065	Cone—Cone complete with voice coil (For Spkr. No. 39223-4)
34450	Speaker—5-inch dynamic speaker complete with cone and voice coil (RL86-4)
	MISCELLANEOUS ASSEMBLIES
35101	Back—Cabinet back for Model 46X11
35102	Back—Cabinet back for Model 46X12
35103	Back—Cabinet back for Model 46X13
X-818	Cloth—Baffle board and grille cloth for Model 46X13 .....net
35104	Crystal—Dial scale crystal for Models 46X11 and 46X12
35105	Crystal—Dial scale crystal for Model 46X13
33317	Fastener—Push on fastener for cabinet backs Models 46X11 and 46X12
35069	Fastener—Push-on fastener for crystal Stock No. 35104
35107	Knob—Ivory tuning, range switch or volume control knob for Model 46X12
35106	Knob—Light mahogany tuning, range switch or volume control knob for Model 46X11
11455	Knob—Walnut tuning, range switch or volume control knob for Model 46X13
11349	Spring—Retaining spring for knob Stock No. 11455
14270	Spring—Retaining spring for knobs Stock Nos. 35106 and 35107

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

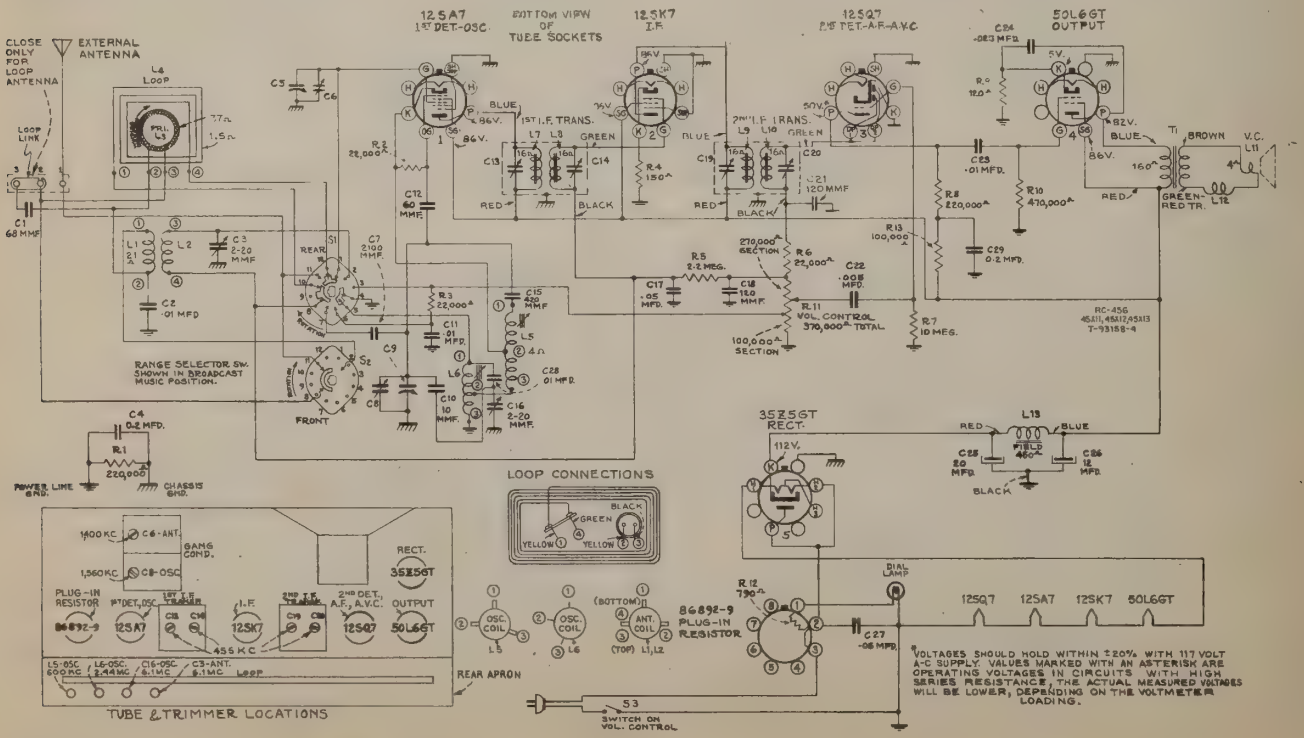
Pre-Setting Pointer.—With gang condenser in full mesh, the pointer should be adjusted to a horizontal position.

Antenna.—The set is equipped with a built-in loop antenna. If the loop antenna is used, the antenna terminal board link should be closed. This link should be open when an external antenna is used. Connect the external antenna to terminal 1. If an antenna longer than 100 feet (including lead-in) is used, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not operate, reverse the plug. On a-c, reversal of the plug may reduce hum.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 grid in series with .01 mfd.	455 kc	"Standard Broadcast" band quiet point with gang nearly open	2nd I-F Trans.
2	12SA7 grid in series with .01 mfd.			1st I-F Trans.
3	Ant. terminal 1 in series with 200 mmfd. Link closed	600 kc	600 kc "Standard Broadcast" band	L5 (osc.)
4		1,560 kc	Pointer at second from bottom mark at extreme right edge of dial plate* "Standard Broadcast" band	C8 (osc.)
5		1,400 kc	Resonance on 1,400 kc signal "Standard Broadcast" band	C6 (ant.)
6		600 kc	Resonance on 600 kc signal "Standard Broadcast" band	L5 (osc.) Rock gang
7	Repeat steps 4, 5, and 6			
8	Ant. terminal 1 in series with 200 mmfd. Link closed	6.1 mc	Pointer on dot at extreme right edge of dial* "Short Wave" band	C16 (osc.)** C3 (ant.) Rock gang
9		2.44 mc	Resonance on 2.44 mc signal "Short Wave" band	L6 (osc.) Rock gang
10	Repeat steps 8 and 9			

*These calibration marks are concealed when chassis is in cabinet.
**Use minimum capacity peak if two can be obtained. Check for selection of correct peak by tuning receiver to approximately 5.19 mc where a weaker signal should be received.



RCA Victor Models 46X21, 46X23, and 46X24

Chassis Nos. RC-461B, RC-461A and RC-461

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U.S.A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

Frequency Ranges..... 550-1,550 kc and 6-18 mc

PUSH BUTTON RANGES (Model 46X24 only)

(1) Approximately 540- 945 kc
(2) Approximately 580-1,020 kc
(3) Approximately 650-1,320 kc
(4) Approximately 760-1,440 kc
(5) Approximately 990-1,560 kc

Intermediate Frequency..... 455 kc

TUBE COMPLEMENT

(1) RCA-12SA7..... 1st Detector—Oscillator
(2) RCA-12SK7..... I-F Amplifier
(3) RCA-12SQ7..... 2nd Detector, AVC, A-F Amplifier
(4) RCA-50L6GT..... Power Output
(5) RCA-35Z5GT..... Rectifier
Dial Lamp (1)..... Mazda No. 47, 6.3 volts, 0.15 amps.

POWER OUTPUT RATING

Undistorted..... 1.1 watts
Maximum..... 1.4 watts

LOUDSPEAKER (RL81A1)

Type..... 5-inch permanent magnet dynamic
Voice Coil Impedance at 400 Cycles..... 4.5 ohms

POWER SUPPLY RATINGS

A-C Rating..... 105-125 volts, 50-60 cycles, 50 watts
D-C Rating..... 105-125 volts, direct current, 50 watts

Model	Cabinet Dimensions	Shipping Wt.
46X21	8 x12x7 (inches)	10⅜ lbs.
46X23	9¼x14x7½ (inches)	12½ lbs.
46X24	10¼x16x7⅜ (inches)	14½ lbs.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES		35000	Resistor—Ballast tube resistor.....	
35000	Ballast—Ballast tube resistor.....		14439	Resistor—100 ohms, ½ watt (R15)	
35097	Can—Shield can for I.F. transformers.....		30936	Resistor—120 ohms, 1 watt (R9).....	
			13428	Resistor—150 ohms, ½ watt (R4).....	
			3153	Resistor—1,500 ohm, 1 watt (R14).....	
14021	Capacitor—22 mmfd. (C41)		13998	Resistor—22,000 ohm, ½ watt (R3, R6).....	
			12454	Resistor—33,000 ohms, ½ watt (R2).....	
13057	Capacitor—68 mmfd. (C12).....		12264	Resistor—220,000 ohm, ½ watt (R1, R8).....	
35663	Capacitor—Mica trimmer comprising 2 sections of 115-440 mmfd., 2 sections of 90-365 mmfd., 2 sections of 42-280 mmfd., 2 sections of 25-190 mmfd. and 2 sections of 10-80 mmfd. for 46X24		12285	Resistor—470,000 ohm, ½ watt (R10).....	
			12679	Resistor—2.2 megohm, ½ watt (R5).....	
			13601	Resistor—10 megohm, ½ watt (R7).....	
			35085	Shaft—Tuning condenser drive shaft.....	
			31418	Spring—Drive cord spring.....	
12725	Capacitor—150 mmfd. (C18, C21, C42).....		35098	Spring—Spring to hold I.F. transformer in cans	
35665	Capacitor—Mica trimmer comprising 1 section of 300-600 mmfd. and 2 sections of 2-20 mmfd.		31319	Socket—Tube socket	
			35094	Socket—Dial lamp socket.....	
13895	Capacitor—5,600 mmfd. (C10).....		35660	Switch—Range switch	
33640	Capacitor—.005 mfd. (C23).....		35662	Switch—Push button switch for 46X24.....	
4937	Capacitor—.01 mfd. (C2, C11, C16).....		35666	Transformer—Audio transformer.....	
			35088	Transformer—First I.F. trans. less shield can...	
			35089	Transformer—Second I.F. trans. less shield can.	
			35000	Tube—Ballast tube resistor.....	
32787	Capacitor—.05 mfd. (C27, C43, C45).....		34373	Washer—Spring washer for tuning shaft.....	
4886	Capacitor—.05 mfd. (C7)				
4839	Capacitor—0.1 mfd. (C28).....			**SPEAKER ASSEMBLIES (RL81A1)**	
34505	Capacitor—0.2 mfd. (C4).....				
35673	Capacitor—Electrolytic comprising 1 section of 50 mfd. and 1 section of .30 mfd. (C25, C26)		32907	Cap—Dust cap	
			35569	Cone—Cone complete with voice coil.....	
35713	Coil—Antenna coil—"C" band—46X21, 23....				
35661	Coil—Antenna coil—"C" band for Model 46X24			**MISCELLANEOUS ASSEMBLIES**	
35096	Coil—Loop loading coil.....				
35714	Coil—Oscillator coil—"A" and "C" bands for Models 46X21 and 46X23.....		35676	Back—Back cover for Model 46X21.....	
			35675	Back—Back cover for Model 46X23.....	
35667	Coil—Oscillator coil—"A" and "C" bands for Model 46X24		35674	Back—Back cover for Model 46X24.....	
			32279	Button—Push button for Model 46X24.....	
35658	Condenser—Tuning condenser—46X21.....		35104	Crystal—Escutcheon and crystal—46X21.....	
35657	Condenser—Tuning condenser—46X23.....		35677	Crystal—Escutcheon and crystal—46X23, 24..	
35656	Condenser—Tuning condenser—46X24.....		35680	Escutcheon—Push button escutcheon—46X24..	
35086	Control—Volume control and power switch....		35678	Fastener—Push on fastener to hold crystal for Model 46X21	
32634	Cord—Drive cord				
35670	Dial—Dial scale for Model 46X21.....		33006	Foot—Rubber foot for Model 46X23.....	
35669	Dial—Dial scale for Model 46X23 and 46X24.		35679	Knob—Volume control, tuning or range switch.	
35659	Drum—Tuning condenser drive drum.....		34317	Marker—Push button markers for Model 46X24	
35668	Indicator—Station selector indicator.....		35681	Rotor—Cabinet rotating disc for Model 46X21	
31480	Lamp—Dial lamp		35682	Rotor—Cabinet rotating disc for Model 46X23.	
35664	Loop—Antenna loop complete		34293	Spring—Retaining spring for button Stock No. 32279 for Model 46X24	
35672	Plate—Dial plate less dial scale—46X21.....		30900	Spring—Retaining spring for knob Stock No. 35679	
35671	Plate—Dial plate less scale—46X23, 24.....				

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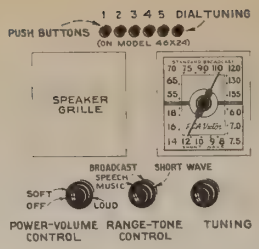


Dial and Controls

Model	Cabinet Description
46X21	Moulded Walnut Plastic
46X23	Walnut
46X24	Walnut (shown above)

Adjustments for Electric Tuning:

The push buttons and corresponding frequency ranges are given in the schematic diagram. Allow the set to warm up for about 15 minutes and proceed as follows:

(1) List five desired stations in order of the push button ranges.

(2) Push in the dial tuning (right hand) button and manually tune in the first station on the list.

(3) Press button No. 1. Turn R-F screw half way in; next turn the oscillator screw entirely in and then gradually back out until the station is heard.

(4) Adjust the R-F trimmer for maximum output. (Clockwise adjustment of oscillator and R-F trimmers tunes the circuits to lower frequencies.)

(5) By turning the set to a position in which reception is weak a final more accurate adjustment may be made.

(6) Adjust for each of the remaining stations in a similar manner and place corresponding station tabs in recesses above buttons. A "Dial Tuning" tab should be above button No. 6.

Precautionary Lead Dress:

(1) Dress all leads away from oscillator and antenna coils.

(2) Dress cathode resistor (R4) and B+ lead across 12SK7 socket between plate and grid terminals.

(3) (46X24 only) Dress leads to push button switch straight up and parallel so that they do not touch each other.

(4) Dress black lead from 1st I-F transformer over green lead.

(5) Keep plate-cathode bypass (C43) of rectifier tube away from volume control.

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Pointer.—With gang condenser in full mesh, the pointer should be adjusted to a horizontal position.

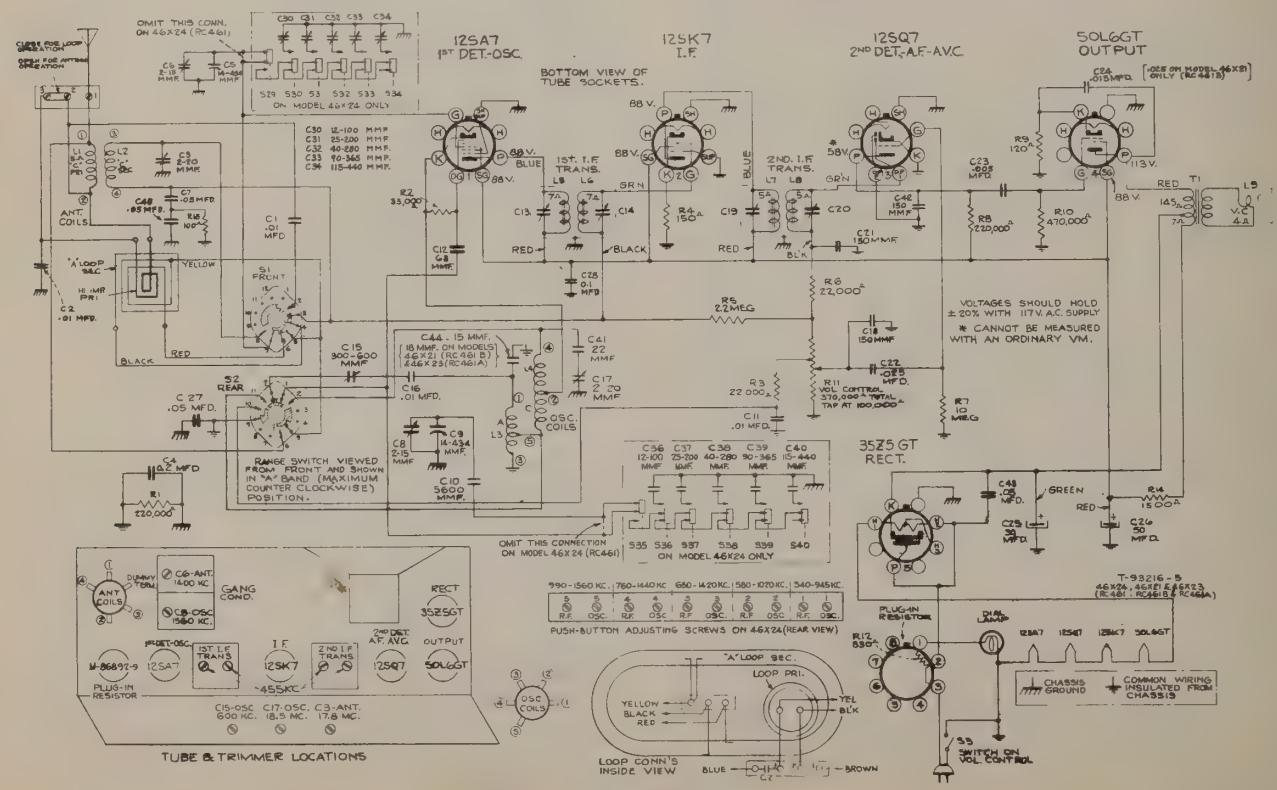
Antenna.—The set is equipped with a built-in loop antenna. If the loop antenna is used, the antenna terminal board link should be closed. This link should be open when an external antenna is used. Connect the external antenna to terminal 1. If an antenna longer than 100 feet (including lead-in) is used, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not operate, reverse the plug. On a-c, reversal of the plug may reduce hum.

Step	Connect high side of test oscillator to—	Tune test oscillator to—	Turn radio dial to—	Adjust following for max. output—
1	Grid 12SK7 in series with 0.01 mfd.	455 kc	"A" Band Quiet Point at 1,550 kc end of dial	C19 and C20 (2nd I-F Trans.)
2	Grid 12SA7 in series with 0.01 mfd.			C13 and C14 (1st I-F Trans.)
3	Antenna in series with 200 mmfd.	600 kc	"A" Band 600 kc	C15 (osc.)
4		1,560 kc	"A" Band Full Clockwise	C8 (osc.)
5		1,400 kc	Resonance on 1,400 kc "A" Band	C6 (ant.)
6	Repeat steps 3 (rock in), 4 and 5			
7	Antenna in series with 300 ohms	18.5 kc	"C" Band Full Clockwise	C17 (osc.)*
8		17.8 kc	"C" Band Resonance on 17.8 kc Signal	C3 (ant.)
9	Repeat steps 7 and 8			

* Use minimum capacity peak if two can be obtained.

Note: Oscillator tracks above signal on all bands.



Schematic Circuit Diagram

RCA Victor

MODEL X55 (Chassis No. RC-473A)

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 48—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U.S.A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,720 kc
INTERMEDIATE FREQUENCY ..... 455 kc
Number of Push Buttons ..... Six

TUBE COMPLEMENT

(1) RCA-12SA7 ..... First Detector-Oscillator
(2) RCA-12SK7 ..... I-F Amplifier
(3) RCA-12SQ7 ..... Second Det., A-F and A.V.C.
(4) RCA-50L6GT ..... Beam Power Output
(5) RCA-35Z5GT ..... Rectifier

DIAL LAMP (1) ..... Mazda No. 51, 7.5 volt, 0.2 amp.

POWER OUTPUT (125 volts, 60 cycle supply)

Undistorted ..... 0.8 watts
Maximum ..... 1.4 watts

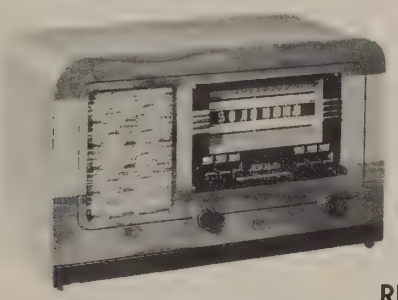
POWER SUPPLY RATINGS

A-C Rating ..... 105-125 volts, 50-60 cycles, 35 watts
D-C Rating ..... 105-125 volts, direct current, 35 watts

LOUDSPEAKER (RL 85-2)

Type ..... 5-inch permanent magnet dynamic
Voice Coil Impedance ..... 4.5 ohms at 400 cycles

	Height	Width	Depth
Cabinet Dimensions (inches)	9-7/16	15⅝	7
Chassis Base Dimensions (inches)	2-3/16	12¼	5¾
Overall Chassis Height	6¾ inches		
Weight (net)	12 pounds		
Weight (shipping)	14 pounds		
Tuning Drive Ratio	10 to 1		



General Description

Model X-55 is a five tube superheterodyne receiver with a tuning range covering the standard broadcast band and one police band. It may be operated on either AC or DC, 105-125 volt supply (see "Power Supply Ratings").

Features of the design include: Improved automatic tuning; "Magic Loop" antenna; new single-ended tubes (12SQ7, 12SA7, 12SK7); terminals for phonograph or television attachment; 5-inch permanent magnet speaker.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLY (RC-473A)	12285	Resistor—470,000 ohms, ½ W.
33719	Belt—Push button arm adjustment belt and rivets	30271	Resistor—4.7 megohm, ½ W.
34024	Board—"Antenna-Ground" board	13601	Resistor—10 megohm, ½ W.
34025	Board—"Radio-Phono" board	33735	Screw—Push arm lock screw
33731	Button—Push button	33725	Shaft—Tuning condenser drive shaft and retainer
12720	Capacitor—100 mmfd., moulded mica	31365	Socket—Lamp socket
12725	Capacitor—150 mmfd., moulded mica	31319	Socket—Tube socket
34213	Capacitor—430 mmfd., mica	33720	Spring—Push button arm return spring
30433	Capacitor—470 mmfd., moulded mica	31418	Spring—Tuning condenser drive cord spring
14393	Capacitor—.01 mfd., 300 volt	33722	Transformer—1st i.f. transformer
11315	Capacitor—.015 mfd., 400 volt	34026	Transformer—2nd i.f. transformer
32787	Capacitor—.05 mfd., 400 volt	33726	Washer—"C" washer for drive shaft
4839	Capacitor—0.1 mfd., 400 volt		**SPEAKER ASSEMBLIES (RL 85-2)**
34505	Capacitor—0.2 mfd., 300 volt		
34212	Capacitor—Electrolytic comprising 2 sections of 50 mfd. each, 150 volts	32907	Cap—Cone center dust cap
33724	Coil—Oscillator coil (L1)	34554	Cone—Speaker cone and voice coil
33728	Condenser—Tuning condenser and drum assembly	34802	Speaker—5-inch permanent magnet—less transformer
33631	Control—Volume control and power switch (S1)	34803	Transformer—Output transformer
32634	Cord—Tuning condenser drive cord		**MISCELLANEOUS ASSEMBLIES**
33633	Indicator—Station selector pointer		
11765	Lamp—Pilot lamp—Mazda No. 51	31456	Cover—8 protective covers for push-button markers
33721	Loop—Antenna loop	33729	Dial—Glass dial scale
33727	Plate—Dial plate frame	33637	Escutcheon—Dial and button escutcheon
30880	Resistor—150 ohm, ½ W.	30863	Knob—Tuning, volume control, or power switch knob
30152	Resistor—1,000 ohms, 1 W.	30900	Spring—Retaining spring for knob or button
12454	Resistor—33,000 ohms, ½ W.	33973	Marker—1 set push-button marker
12412	Resistor—47,000 ohm, ½ W.		
12264	Resistor—220,000 ohms, ½ W.		

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Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the schematic drawing.

Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver ground binding post, and keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should be set to the extreme left (low frequency) mark on the dial scale.

Steps	Connect the high side of the test-osc. to—	Tune test osc. to—	Turn radio dial to	Adjust the following for maximum peak output
1	Ant. terminal	455 kc	Quiet Point between 1,720-1,500 kc	C3 and C4 (2nd I-F trans.)
2	Ant. terminal			C1 and C2 (1st I-F trans.)
3	Ant. terminal in series with 200 mmfd.	1,500 kc	1,500 kc calibration mark	C6 (osc.) C5 (ant.)
4		600 kc	600 kc calibration mark	L1 (osc.) (Rock in)
5	Repeat step 3.			

After mounting chassis in cabinet, check the dial calibration on stations of known frequency. If calibration is not correct, move pointer to agree with dial calibration. **Note.**—Oscillator tracks above signal.

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

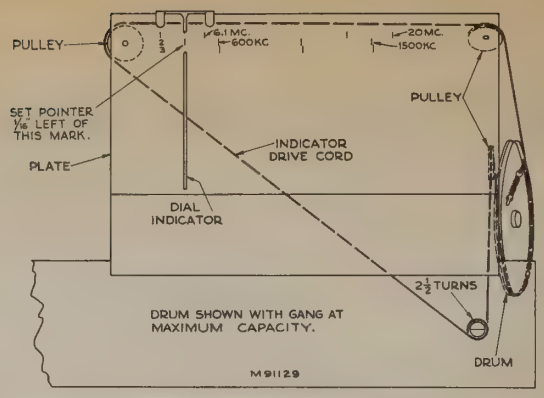
1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

2. Turn the accessory switch to "Radio" position and accurately tune in the station for which the first button is to be set.

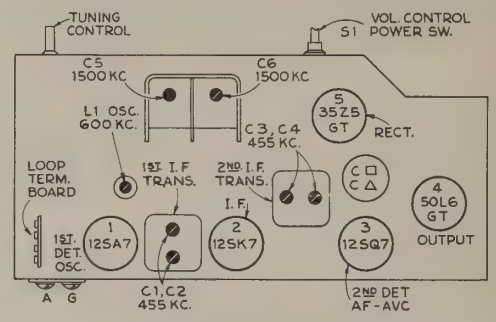
3. Press in push-button rod No. 1 (left) with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¼ turn after the rod begins to grip or damage to the mechanism may result.

4. Replace the push-button on its shaft.

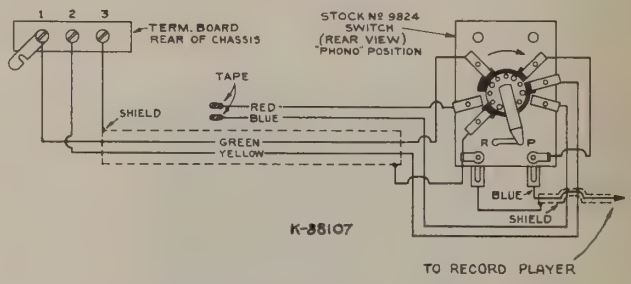
5. Proceed in a similar manner for the remainder of the push-buttons.



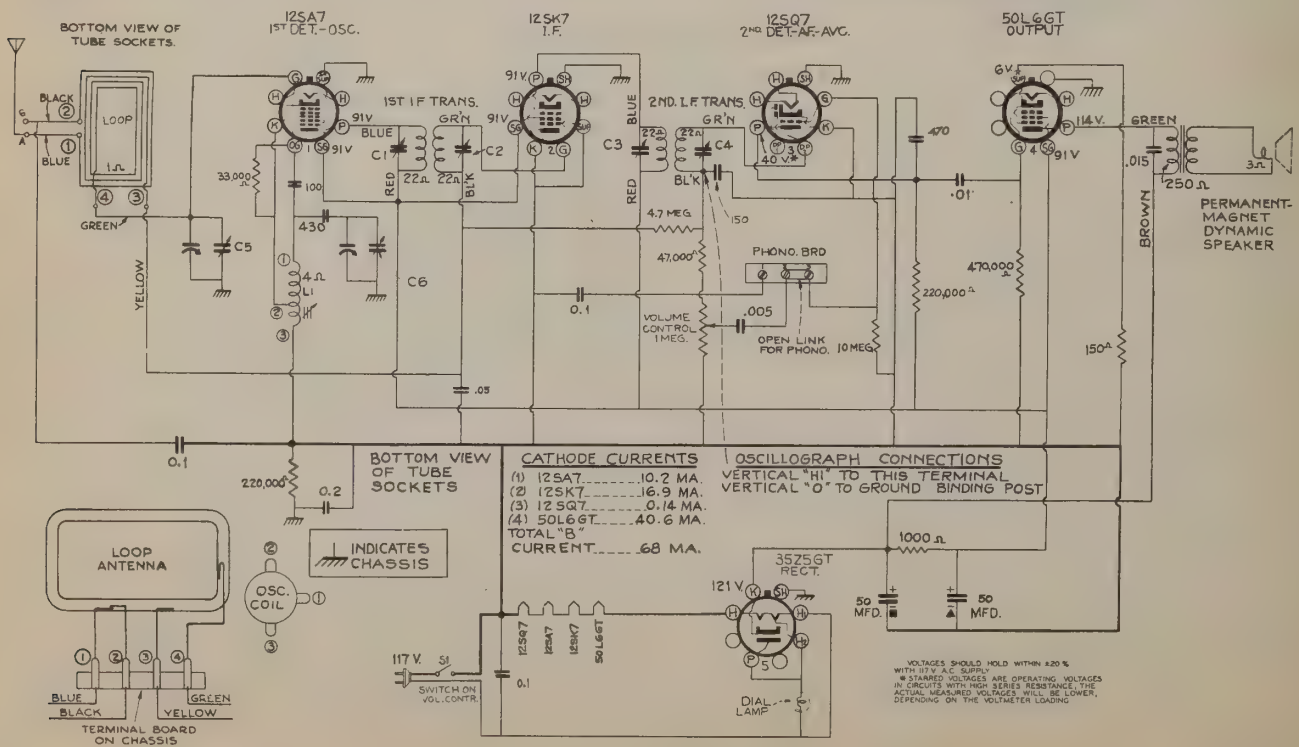
Dial-Indicator and Drive Mechanism



Tube and Trimmer Locations



Record Player Connections, Using a No. 9824 Switch



Schematic Circuit Diagram

RCA Victor

MODEL X60 (Chassis No. RC-474D)

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 44—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast	540-1,720 kc
Short Wave	5.6-20 mc
Intermediate Frequency	455 kc
Number of Push Buttons	Six

TUBE COMPLEMENT

(1) RCA-12SA7	First Detector-Oscillator
(2) RCA-12SK7	I-F Amplifier
(3) RCA-12SQ7	Second Detector, A-F, and A.V.C.
(4) RCA-35L6GT	Power Output
(5) RCA-6N5	Magic Eye
(6) RCA-35Z5GT	Rectifier
Dial Lamp	Mazda No. 51, 7.5 volts, 0.20 amp.

POWER OUTPUT (125 volts, 60 cycle supply)

Undistorted	0.8 watts
Maximum	1.4 watts

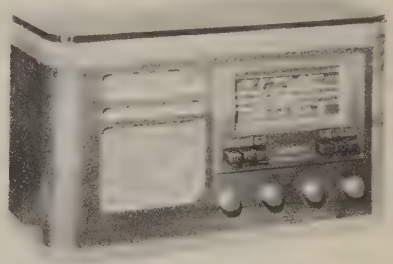
POWER SUPPLY RATINGS

A-C Rating	105-125 volts, 50-60 cycles, 35 watts
D-C Rating	105-125 volts, direct current, 35 watts

LOUDSPEAKER (RL 85-2)

Type	5-inch permanent magnet dynamic
V.C. impedance at 400 cycles	4.5 ohms

	Height	Width	Depth
Cabinet Dimensions (inches)	9⅝	16	7
Chassis Base Dimensions (inches)	2-3/16	12½	5¾
Overall Chassis Height	6¾ inches		
Shipping Weight	15 pounds		
Tuning Drive Ratio	10:1		



Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-474D)
33719	Belt—Push button adjusting belts
34024	Board—"Antenna-Ground" board
34025	Board—"Radio-Phono" board
33731	Button—Push button
30766	Cap—Rubber shield for Magic Eye
33629	Capacitor—Trimmer capacitor comprising of 2 sections (C7, C8)
12723	Capacitor—56 mmfd., moulded mica
12720	Capacitor—100 mmfd., moulded mica
12725	Capacitor—150 mmfd., moulded mica
12694	Capacitor—220 mmfd., moulded mica
13895	Capacitor—5,600 mmfd., moulded mica
30303	Capacitor—.0035 mfd., 700 volts
33584	Capacitor—.005 mfd., 1,200 volts
4937	Capacitor—.01 mfd., 500 volts
11315	Capacitor—.015 mfd., 400 volts
4870	Capacitor—.025 mfd., 400 volts
32787	Capacitor—.05 mfd., 400 volts
4839	Capacitor—0.1 mfd., 400 volts
34505	Capacitor—0.2 mfd., 300 volts
34212	Capacitor—Comprising 2 sections of 50 mfd., each, 150 volts
30716	Clip—Magic Eye clip
33732	Coil—Antenna coil
33733	Coil—Oscillator coil
33635	Condenser—Tuning condenser and drum assembly
33631	Control—Volume control and power switch
32634	Cord—Tuning condenser drive cord
33633	Indicator—Station selector pointer
11765	Lamp—Dial lamp—Mazda No. 51
33734	Plate—Dial plate complete less condenser and button
30880	Resistor—150 ohms, ½ watt
30152	Resistor—1,000 ohms, 1 watt
14284	Resistor—22,000 ohms, 1/10 watt
13998	Resistor—22,000 ohms, ½ watt
12454	Resistor—33,000 ohms, ½ watt
12412	Resistor—47,000 ohms, ½ watt
12264	Resistor—220,000 ohms, ½ watt
12285	Resistor—470,000 ohms, ½ watt
30271	Resistor—4.7 megohm, ½ watt
13601	Resistor—10 megohm, ½ watt
33438	Screw—Magic Eye clip screw
33725	Shaft—Tuning knob drive shaft and retainer
31365	Socket—Dial lamp socket
13871	Socket—Magic Eye socket
31319	Socket—Tube socket
31418	Spring—Tuning condenser drive cord spring
33720	Spring—Push arm return spring
33946	Switch—Range switch (S1)
34336	Switch—Tone control switch (S3)
33722	Transformer—First i-f transformer (C1, C2)
34026	Transformer—Second i-f transformer (C3, C4)
33726	Washer—"C" washer for drive shaft
	SPEAKER ASSEMBLIES (RL 85-2)
32907	Cap—Cone center dust cap
34554	Cone—Speaker cone and voice coil
34803	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
31456	Cover—8-protective covers for push button markers
34270	Dial—Glass dial scale
33637	Escutcheon—Dial and button escutcheon
30863	Knob—Tuning, tone, range or volume control
33973	Marker—1 set push button markers
30900	Spring—Retaining spring for knob or button

First Edition

Trademarks "Magic Eye," "RCA Victor," "Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver ground binding post, and keep the output as low as possible to avoid A.V.C. action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks corresponding to dial readings of 600 kc, 1,500 kc, 6.1 mc, and 20 mc have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point 1/16 inch to the left of the mark at the extreme left (low frequency) end of the dial scale.

Steps	Connect the high side of the test osc. to—	Tune test osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Antenna terminal	455 kc	"A" Band Quiet Point between 550-750 kc	C3 and C4 (2nd I-F trans.)
2				C1 and C2 (1st I-F trans.)
3	Antenna terminal in series with 300 ohms	20 mc	"C" Band 20 mc calibration mark	C5 (osc.) *
4	Antenna terminal in series with 200 mmf.	1,500 kc	"A" Band 1,500 kc calibration mark	C7 (osc.) C6 (ant.)
5		600 kc	"A" Band 600 kc calibration mark	C8 (osc.) Rock gang
6	Repeat step 4			

* Use minimum peak if two can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

Note: Oscillator tracks above signal on both bands.

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.

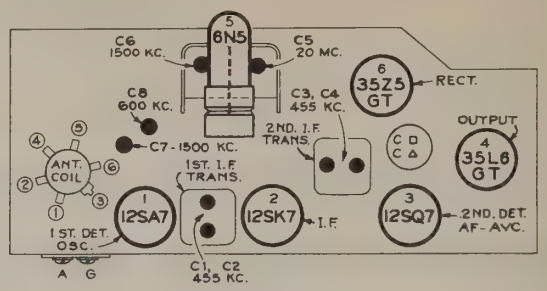
2. Check to be sure the link connection on back of chassis is in "Radio" position (connected between terminals 2 and 3).

3. Press in push-button No. 1 (left) as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than ¾ turn after the screw begins to grip or damage to the mechanism may result.

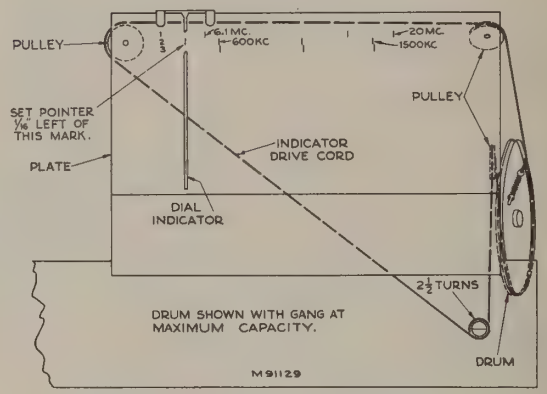
4. Replace the push-button on its shaft.

5. Proceed in a similar manner for the remainder of the push-buttons.

6. Insert the station marker tabs in the recesses above the push-buttons.

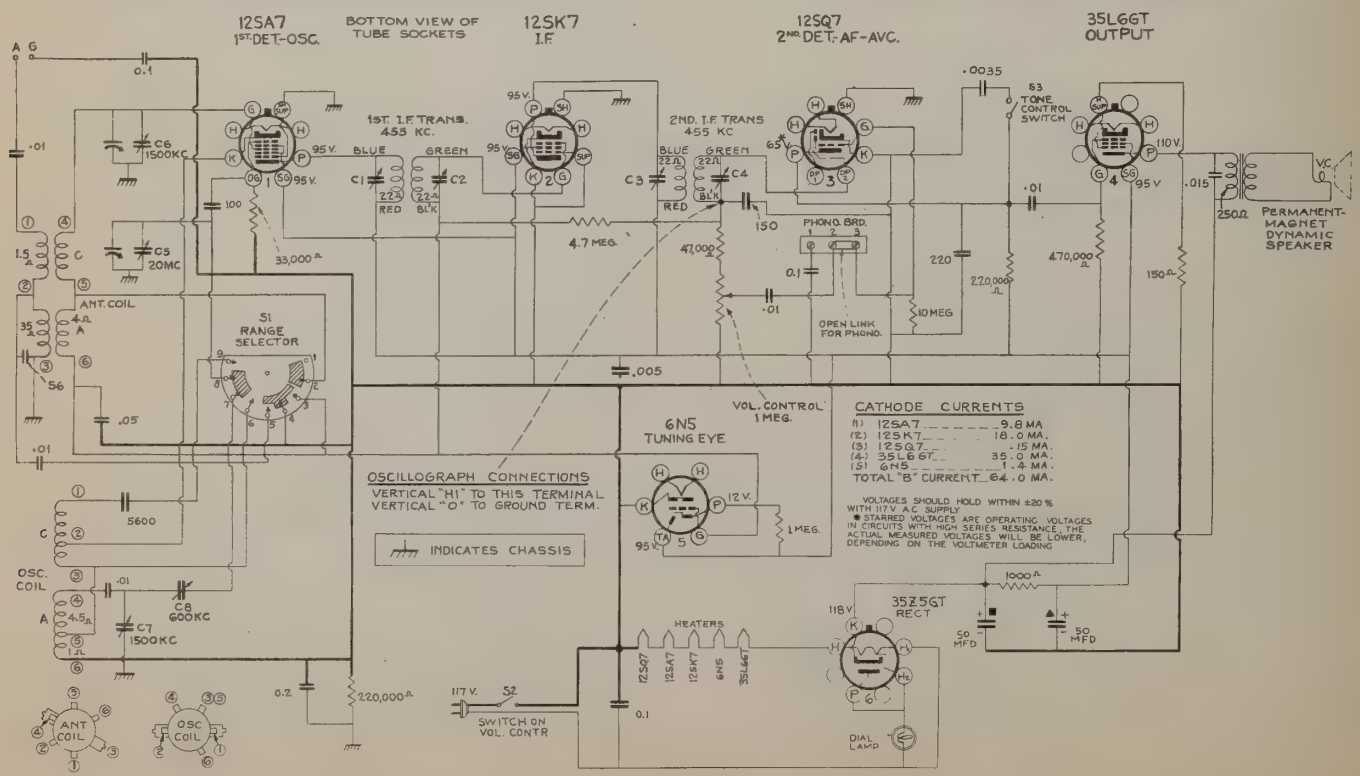


Tube and Trimmer Locations



Dial-Indicator and Drive Mechanism

Refer to "Alignment Procedure" for explanation of the "calibration marks" shown in this drawing


12SA7 1ST. DET.-OSC.
BOTTOM VIEW OF TUBE SOCKETS
12SK7 I.F.
12SQ7 2ND. DET.- AF-AVC.
35L6GT OUTPUT
1ST. I.F. TRANS. 455 KC.
2ND. I.F. TRANS 455 KC
TONE CONTROL SWITCH
PERMANENT-MAGNET DYNAMIC SPEAKER
ANT. COIL
S1 RANGE SELECTOR
PHONO. BRD.
OPEN LINK FOR PHONO.
VOL. CONTROL 1 MEG.
6N5 TUNING EYE
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO THIS TERMINAL
VERTICAL "O" TO GROUND TERM.
INDICATES CHASSIS
OSC. COIL
SWITCH ON VOL. CONTR
HEATERS
35Z5GT RECT
DIAL LAMP
CATHODE CURRENTS
(1) 12SA7 ..... 9.8 MA
(2) 12SK7 ..... 18.0 MA.
(3) 12SQ7 ..... 1.5 MA.
(4) 35L66T ..... 35.0 MA.
(5) 6N5 ..... 1.4 MA.
TOTAL "B" CURRENT 64.0 MA.
VOLTAGES SHOULD HOLD WITHIN ±20% WITH 117 V. AC SUPPLY
*STARRED VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE. THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.

RCA Victor

Models 96T4, 96T5 and 96T6

CHASSIS No. RC-399, RC-399A

Six-Tube, Electric-Tuning, Two-Band, A-C—D-C, Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 4—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U.S.A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

"Standard Broadcast" (A) ..... 540-1,720 kc
"Short Wave" (C) ..... 5.8-18.0 mc
Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT

(1) RCA-6SA7 ..... First Detector—Oscillator
(2) RCA-6K7 ..... I-F Amplifier
(3) RCA-6SQ7 ... Second Detector, A.V.C., and A-F Amp.
(4) RCA-25L6 ..... Power Output
(5) RCA-25Z6G ..... Half-Wave Rectifier
(6) RCA-BK49B ..... Ballast Tube
Pilot Lamp ..... Mazda 47, 6.3 volts, 0.15 amp.

POWER OUTPUT RATING

Undistorted ..... 1.5 watts
Maximum ..... 2.5 watts

LOUDSPEAKER

Type ..... Permanent Magnet Dynamic
Diameter ..... 96T4, 5: 5 inch—96T6: 6 inch
V.C. Impedance ..... 2 ohms at 400 cycles

POWER SUPPLY RATINGS

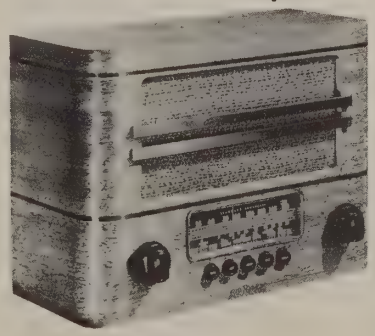
A-C Rating ..... 105-125 volts, 25-60 cycles, 60 watts
D-C Rating ..... 105-125 volts, direct current, 60 watts

Mechanical Specifications

Models	96T4	96T5	96T6
Height (inches)	9½	9½	11¼
Width (inches)	12	12	15⅝
Depth (inches)	6⅛	6⅛	6 15/16
Net Weight (pounds)	11	11	14
Shipping Weight (pounds)	13	13	17
Chassis Base Dimensions	11 3/16-in. wide, 5-in. deep, 2⅞-in. high		
Over-all Chassis Height	8 inches		
Tuning Drive Ratio	8 to 1		

General Description

Model 96T4



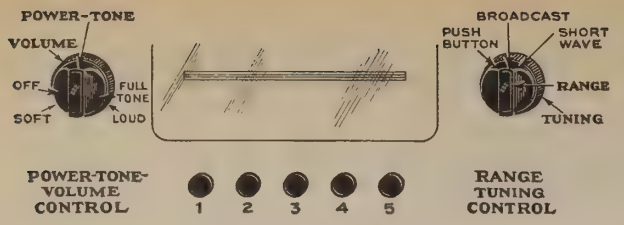
Model 96T5

Model 96T6

All models have electric tuning for five stations in the standard broadcast range.

Features of design include: Magnetite-core electric-tuning coils; magnetite-core i-f transformers; temperature-compensated capacitor in the oscillator circuit; high-frequency tone control; straight-line dial; dust-proof permanent magnet dynamic loudspeaker.

Power Supply Polarity.—On d-c operation, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the position of the plug. On a-c operation, a similar reversal of the plug may reduce hum.



Location of Controls

Alignment Procedure

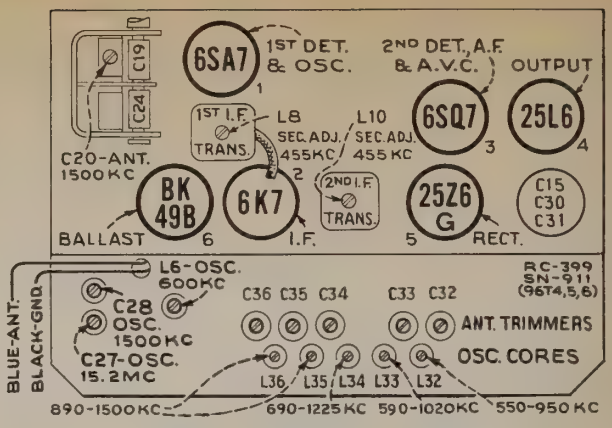
Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the black lead and keep the output as low as possible to avoid a-v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks corresponding to dial readings of 600 kc, 1,500 kc, and 15.2 mc. have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left mark on the dial scale.

For additional details, refer to booklet "RCA Victor Receiver Alignment."



Tube and Trimmer Locations

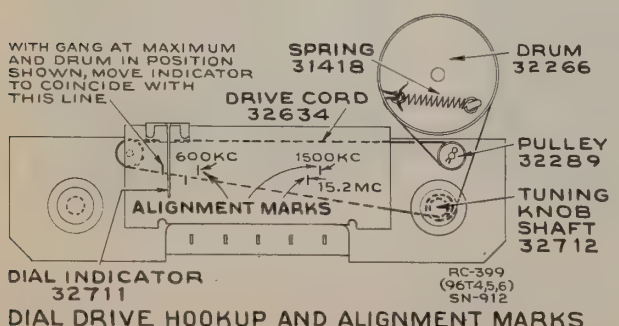
Adjustments for Electric Tuning

These models have five push buttons for electric tuning of five different stations in the standard-broadcast range. The station buttons connect to separate magnetite-core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31031. Allow at least five minutes warm-up period before making adjustments. Use a regular antenna for the preliminary adjustments.

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	"A" band, Quiet Point between 550-750 kc	L9 and L10 (2nd I-F Trans.)
2	Tuning condenser Stator (osc.) in series with .01 mfd.	455 kc		L7 and L8 (1st I-F Trans.)
3	Antenna Lead (Blue), in series with 200 mmf.	1,500 kc	1,500 kc (Cal. Mark) "A" Band	C28 (osc.) C20 (ant.)
4	Antenna Lead (Blue), in series with 200 mmf.	600 kc	600 kc (Cal. Mark) "A" Band	L6 (osc.)
5	Repeat steps 3 and 4.			
6	Antenna Lead (Blue), in series with 400 ohms	15.2 mc	15.2 mc (Cal. Mark) "C" Band	C27 (osc.)*
7	Follow "Adjustments for Electric Tuning."			

* Rock gang slightly while peaking C27, and use minimum capacity peak if two peaks can be obtained on C27.

Note.—Oscillator tracks 455 kc above signal on both bands.

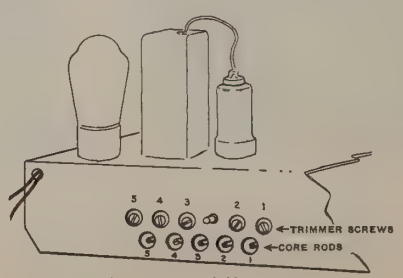


Dial-Indicator and Drive Mechanism

Refer to "Alignment Procedure" for explanation of the "calibration marks" shown in this drawing.

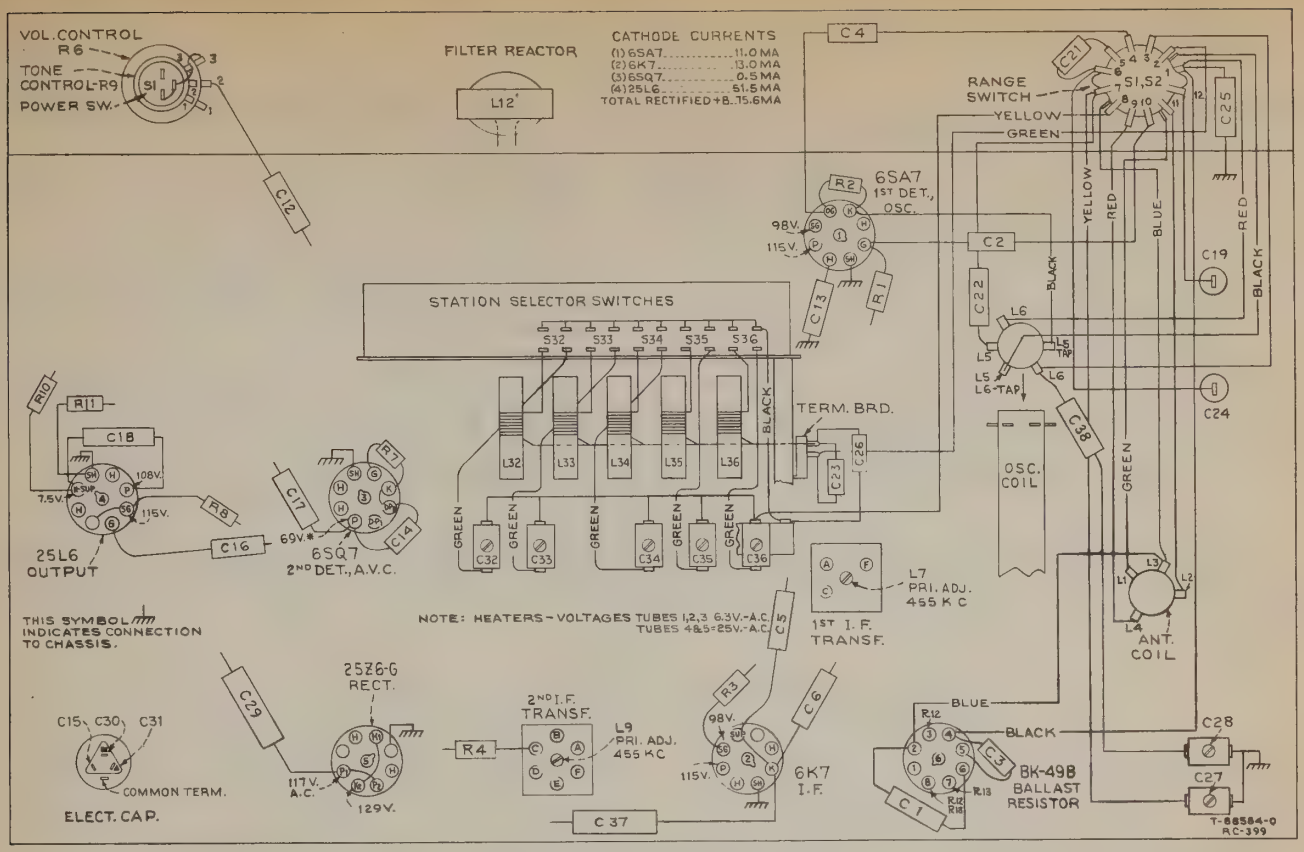
The procedure is as follows:

1. Make a list of the five desired stations, arranged in



Push-Button Adjustments

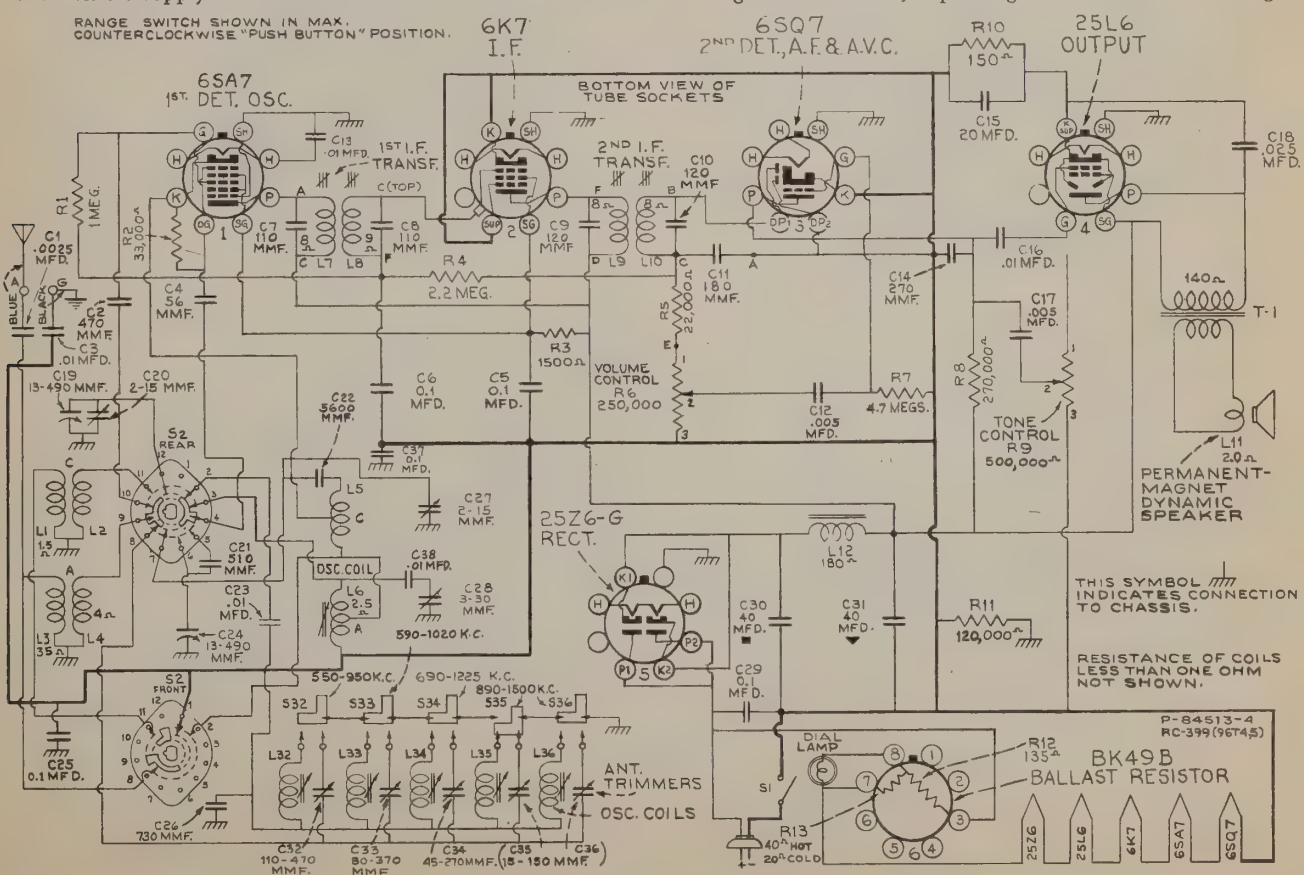
No. 1—Approximately 550-950 kc.
No. 2—Approximately 590-1,020 kc.
No. 3—Approximately 690-1,225 kc.
Nos. 4, 5—Approximately 890-1,500 kc.



R-F Wiring Diagram and Socket Voltages

Measurements made to low-side of volume control unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ±20% with 117 volt a-c supply.

* **Note:** Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.



Schematic Circuit Diagram

order from low to high frequencies.

2. Turn Range Control Knob to "Broadcast" position and tune in station No. 1 (560 kc in example) by Manual Dial Tuning, for reference.
3. Push in station-button No. 1 and turn Range Selector to "PB" position. Adjust No. 1 oscillator core (L32) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until the station is received.
4. Adjust No. 1 antenna trimmer (C32) for maximum output on this station.
5. Adjust for each of the remaining four stations in the same manner.

(Clockwise adjustment of oscillator cores and antenna trimmers tunes the circuits to lower frequencies.)

6. Make a final careful adjustment of the oscillator cores and antenna trimmers, using one or two feet of wire as an antenna to ensure sharp peaking.

Miscellaneous Service Data

Precautionary Lead Dress.—

1. Volume control lead from 2nd I.F. transformer (E) should be dressed down on chassis.
2. A.C. leads to ballast tube should be dressed away from volume control lead on 2nd I.F. transformer.
3. Coupling condensers C2 and C4 should be dressed away from chassis.

Removing Push-Button Assembly.—The push-button assembly is held to the chassis by two nuts on the front apron and may be quickly and easily swung out for convenient access to the sockets and other parts. No unsoldering is required, as flexible leads are used for all connections from the chassis to the assembly.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC399—Models 96T4 and 96T5) (RC399A—Model 96T6)
32544	Ballast—Ballast resistor tube — type BK49B (R12, R13)
31379	Capacitor—Dual trimmer, comprising one 3-30 mmfd. and one 2-10 mmfd. sections (C27, C28)
12723	Capacitor—56 mmfd. (C4)
14262	Capacitor—109 mmfd. (C7, C8)
12404	Capacitor—120 mmfd. (C9, C10)
14712	Capacitor—180 mmfd. (C11)
12488	Capacitor—270 mmfd. (C14)
30433	Capacitor—470 mmfd. (C2)
12537	Capacitor—560 mmfd. (C21)
32714	Capacitor—730 mmfd. (C26)
13895	Capacitor—5,600 mmfd. (C22)
5107	Capacitor—.0025 mfd., 700 volts (C1)
4838	Capacitor—.005 mfd., 1,000 volts (C12, C17)
14393	Capacitor—.01 mfd., 300 volts (C3, C13, C16, C23, C38)
4870	Capacitor—.025 mfd., 400 volts (C18)
4839	Capacitor—0.1 mfd., 400 volts (C5, C6, C25, C29, C37)
32708	Capacitor—Electrolytic, comprising two 40 mfd., and one 20 mfd. sections (C15, C30, C31)
32705	Capacitor—Push button trimmer capacitor bank (C32, C33, C34, C35, C36)
31382	Clip—Push button coil mounting clip
32706	Coil—Antenna coil (L1, L2, L3, L4)
32707	Coil—Oscillator coil (L5, L6)
31385	Coil—Push button oscillator coil — less core 550-950 KC. (L32)
32704	Coil—Push button oscillator coil — less core 590-1,020 KC. (L33)
32340	Coil—Push button oscillator coil — less core 690-1,225 KC. (L34)
31383	Coil—Push button oscillator coil — less core 890-1,500 KC. (L35, L36)
32249	Condenser—2-gang variable (C19, C20, C24)
31413	Control — Volume control, tone control, and power switch (R6, R9, S1)
32634	Cord—Drive cord
31386	Core—Core and stud for coil, Stock Nos. 31383, 31385, and 32704
30846	Core—Core and stud for coil, Stock No. 32340
32713	Core—Core and stud for oscillator coil, Stock No. 32707
32266	Drum—Condenser drive cord drum
32711	Indicator—Dial indicator pointer
31480	Lamp—Dial lamp socket
32710	Plate—Dial color plate and pointer track
5119	Plug—3-contact female for speaker cable
32289	Pulley—Indicator drive cord pulley
32709	Reactor—Filter reactor (L12)
30880	Resistor—150 ohms, ½ watt (R10)
14499	Resistor—1,500 ohms, ½ watt (R3)
14284	Resistor—22,000 ohms, 1/10 watt (R5)
12454	Resistor—33,000 ohms, ½ watt (R2)
13734	Resistor—120,000 ohms, ½ watt (R11)
12199	Resistor—270,000 ohms, ½ watt (R8)
13730	Resistor—1 meg., ½ watt (R1)
12679	Resistor—2.2 meg., ½ watt (R4)
30271	Resistor—4.7 meg., ½ watt (R7)
32544	Resistor—Ballast resistor tube—type BK49B (R12, R13)
30340	Retainer—Pulley retaining clip
14343	Retainer—Tuning knob shaft retaining ring
4669	Screw—No. 8-32 x ¾ square head set screw for drum
32712	Shaft—Tuning knob shaft and pulley
31365	Socket—Dial lamp socket
31251	Socket—Octal base tube socket
31418	Spring—Drive cord tension spring
32703	Switch—Push button switch (S32, S33, S34, S35, S36)
32702	Switch—Range switch (S2)
14376	Transformer—First i.f. transformer (L7, L8, C7, C8)
14308	Transformer—Second i.f. transformer (L9, L10, C9, C10, C11, R5)
32544	Tube—Ballast resistor tube — type BK49B (R12, R13)
	SPEAKER ASSEMBLIES (84226-4) Models 96T4 and 96T5
32716	Cone—Speaker cone and voice coil in housing (L11)
32715	Speaker—Complete
32717	Transformer—Output transformer (T1)
	SPEAKER ASSEMBLIES (84307-4) Model 96T6
32719	Cone—Speaker cone and voice coil in housing (L11)
5118	Plug—3-contact male plug for speaker
32718	Speaker—Speaker complete
32720	Transformer—Output transformer (T1)
	MISCELLANEOUS ASSEMBLIES
31428	Button—Push button and spring
31487	Clip—Spring clip to hold dial scale
31095	Cover—One set protective covers for call letter markers
32722	Dial—Glass dial scale
31667	Escutcheon—Dial escutcheon (no crystal)
31355	Knob—Range switch knob
31391	Knob—Tone control knob
14359	Knob—Tuning knob
30773	Knob—Volume control knob
30991	Markers—One set station call letter markers
32721	Spring—Push button spring
14270	Spring—Retaining spring for range switch or volume control knob
30330	Spring—Retaining spring for tone control knob
4982	Spring—Retaining spring for tuning knob

RCA Victor

MODELS 96X-1, -2, -3, -4 and -11, -12, -13, -14

Chassis No. RC-400 and RC-400A

Six-Tube, Two-Band, A-C—D-C, Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 3—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U.S.A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGES

"Standard Broadcast" (A) (left) ..... 540-1,720 kc
"Short Wave" (C) (right) ..... 5,800-18,000 kc

TUBE COMPLEMENT

(1) RCA-6K8 ..... 1st.-Detector—Oscillator
(2) RCA-6SK7 ..... I-F Amplifier
(3) RCA-6SQ7 ..... 2nd-Det., 1st A-F, and A.V.C.
(4) RCA-25L6 ..... Power Output
(5) RCA-25Z6G ..... Half-Wave Rectifier
(6) RCA-BK-49B ..... Ballast

Pilot Lamp ..... Mazda No. 47, 6.3 volts, 0.15 amp.

POWER SUPPLY RATINGS

A-C Rating ..... 105-125 volts, 50-60 cycle, 50 watts
D-C Rating ..... 105-125 volts, direct current, 50 watts

INTERMEDIATE FREQUENCY ..... 455 kc

POWER OUTPUT (125 volts, 60 cycle supply)

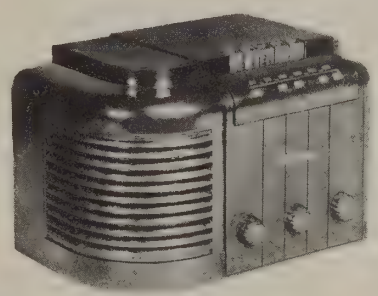
Undistorted 1.5 watts—Maximum ..... 2.0 watts

LOUDSPEAKER Type 84202-3 ..... 5-inch Electrodynamic

Cabinet Dimensions....H. 7¼ inches W. 11¼ inches D. 7⅞ inches
Weights (net) 96X1, 2, 3, 4—8½ lbs. .. 96X11, 12, 13, 14—9¼ lbs.
Tuning Drive Ratio ..... 8 to 1

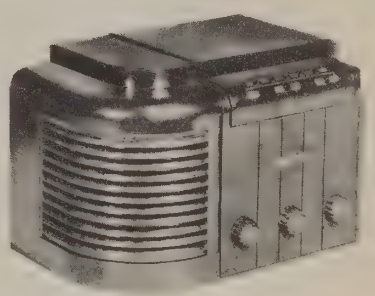
25 Cycle Operation.—For 25 cycle operation change filter condensers to 40-40 mfd.

Models 96X-11 Walnut Finish
96X-12 Black Finish
96X-13 Walnut and Ivory Finish
96X-14 Ivory Finish



With Push-Button Tuning

Models 96X-1 Walnut Finish
96X-2 Black Finish
96X-3 Walnut and Ivory Finish
96X-4 Ivory Finish



Without Push-Button Tuning

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES		4858	Condenser—.01 mfd	
32999	Back—Cardboard back for cabinet		5196	Condenser—.035 mfd	
32544	Ballast—Ballast resistor type BK49B		4886	Condenser—.05 mfd	
32530	Button—Ivory push button for 96X11, 96X12 and 96X14		4839	Condenser—0.1 mfd	
32528	Button—Walnut push button for 96X13		32548	Condenser—Electrolytic, one 12 mfd. and one 20 mfd. sections	
X-580	Cabinet for 96X1 (net)		32536	Condenser—Variable tuning condenser	
X-581	Cabinet for 96X2 (net)		31456	Cover—1 set protective covers for push button markers	
X-582	Cabinet for 96X3 (net)		32539	Cord—Condenser drive cord	
X-583	Cabinet for 96X4 (net)		32540	Cord—Dial drive cord	
X-644	Cabinet for 96X11 (net)		32526	Dial—Black dial scale for 96X2 and 96X12	
X-585	Cabinet for 96X12 (net)		32527	Dial—Ivory dial scale for 96X4 and 96X14	
X-645	Cabinet for 96X13 (net)		32525	Dial—Walnut dial scale for 96X1, 96X3, 96X11 and 96X13	
X-646	Cabinet for 96X14 (net)		32290	Gear—Sector gear fastens on cam shaft of tuning mechanism — Models 96X11, 96X12, 96X13, 96X14	
32531	Coil—Antenna coil		32542	Indicator—Dial indicator drum	
32532	Coil—Oscillator coil		32522	Knob—Ivory knob for 96X1, 96X2, 96X4, 96X11, 96X12, 96X14	
31379	Condenser—Trimmer, one 3-30 mmfd. and one 2-10 mmfd. sections (C5, C7)		32520	Knob—Tan knob for 96X3 and 96X13	
14079	Condenser—6.8 mmfd				
13057	Condenser—60 mmfd				
12488	Condenser—250 mmfd				
31399	Condenser—4,700 mmfd				

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
31480	Lamp—Dial lamp		31482	Screw—No. 8-32 set screw for condenser drive pulley or sector gear	
31589	Marker—1 set push button call letter markers		32510	Screw—Push button cam locking screw—Models 96X11, 96X12, 96X13, 96X14	
32810	Mechanism—Push button tuning mechanism comprising push arms, cam plate, frame, and mounting bracket assembled—Models 96X11, 96X12, 96X13, 96X14		32547	Shaft—Tuning knob shaft	
32538	Pulley—Condenser drive pulley and gear—Models 96X11, 96X12, 96X13 and 96X14		32543	Socket—Dial lamp socket and bracket	
32541	Pulley—Condenser drive pulley—Models 96X1, 96X2, 96X3, 96X4		32537	Socket—Tube socket	
31606	Pulley—Indicator drum pulley		31615	Spring—Drive cord tension spring	
32544	Resistor—Ballast resistor type BK49B		30585	Spring—Push button lever spring—Models 96X11, 96X12, 96X13, 96X14	
14439	Resistor—100 ohms, ½ watt		31646	Spring—Retaining spring for knobs	
32535	Resistor—120 ohms, wire wound		32546	Switch—Band change switch	
14499	Resistor—1,500 ohms, ½ watt		32533	Transformer—First i.f. transformer	
12454	Resistor—33,000 ohms, ½ watt		32534	Transformer—Second i.f. transformer	
12412	Resistor—47,000 ohms, ½ watt		32545	Volume control and power switch	
12264	Resistor—220,000 ohms, ½ watt			SPEAKER ASSEMBLIES (84202-3)	
12285	Resistor—470,000 ohms, ½ watt		31202	Cone—Speaker cone and voice coil	
12679	Resistor—2.2 meg., ½ watt				
13601	Resistor—10 meg., ½ watt		31203	Transformer—Output transformer	

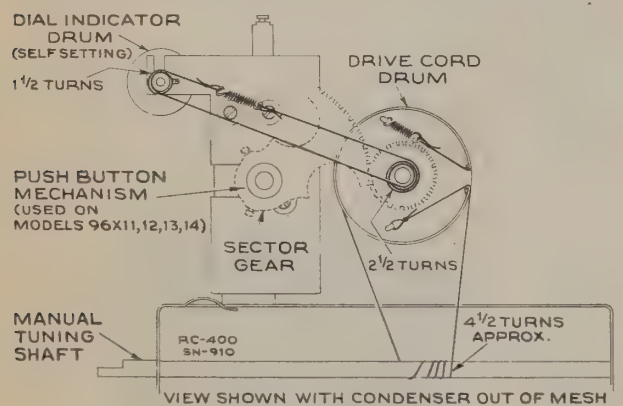
Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Dial Setting.—To set dial indicator drum, turn tuning condensers fully clockwise and then counter-clockwise.

Push-button Adjustments.—Remove bakelite button and loosen screw two turns with a screwdriver or coin. Tune in the desired station by means of the right-hand control knob. Press push lever down as far as it will go and tighten screw. Release lever and put on push-button.



DRIVE CORD HOOKUP

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Tuning condenser stator (osc.) in series with .01 mfd.†	455 kc	Quiet point between 550-750 kc	C1, C2, C3, C4 (1st and 2nd I-F transformer)
2	Antenna lead (yellow) in series with 400 ohms	19.25 mc	Full clockwise (out of mesh) "C" band	C5* (osc.)
3	Same as step 2	15.0 mc	15.0 mc Test oscillator signal	C6** (ant.) See Note No. 1
4	Antenna lead in series with 200 mmf condenser	1,745 kc	Full clockwise (out of mesh) "A" band	C7 (osc.)

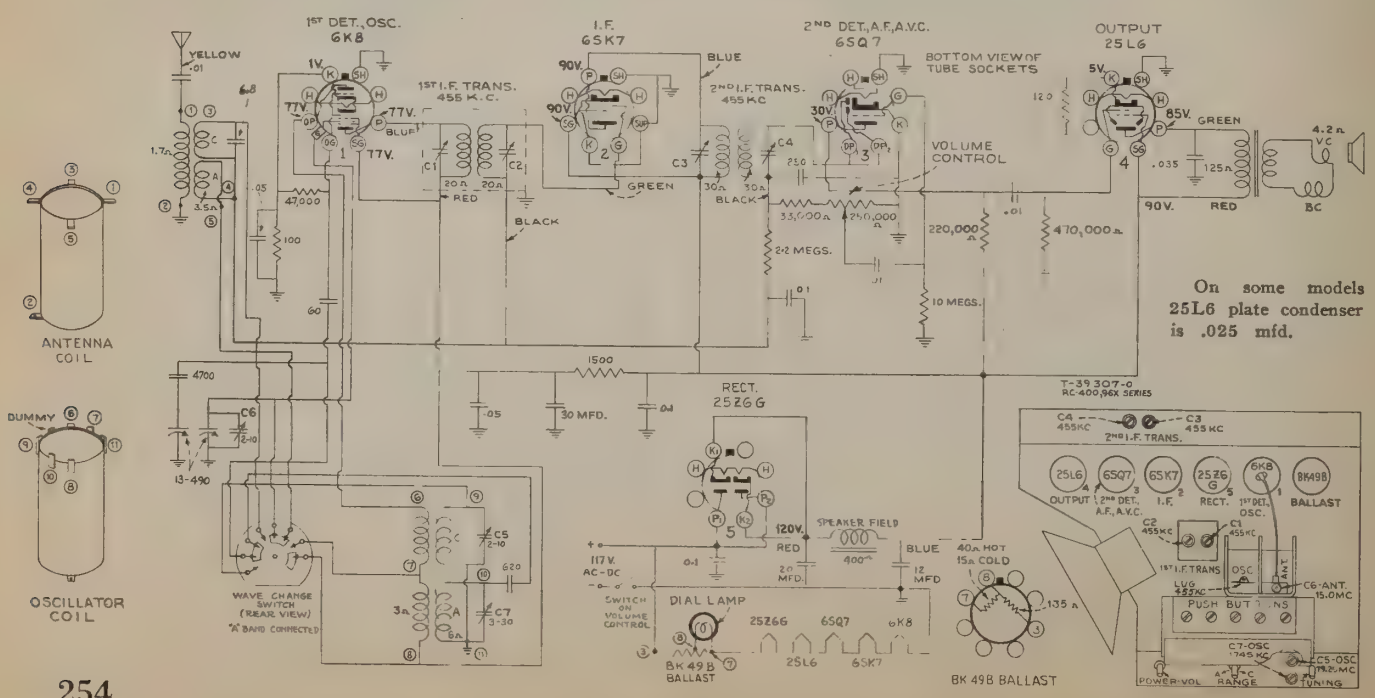
* Use minimum capacity peak if two peaks can be obtained.

** Rock gang slightly and check to determine that C5 has been adjusted to the correct peak by tuning to approximately 14.09 mc, where a weaker signal should be received.

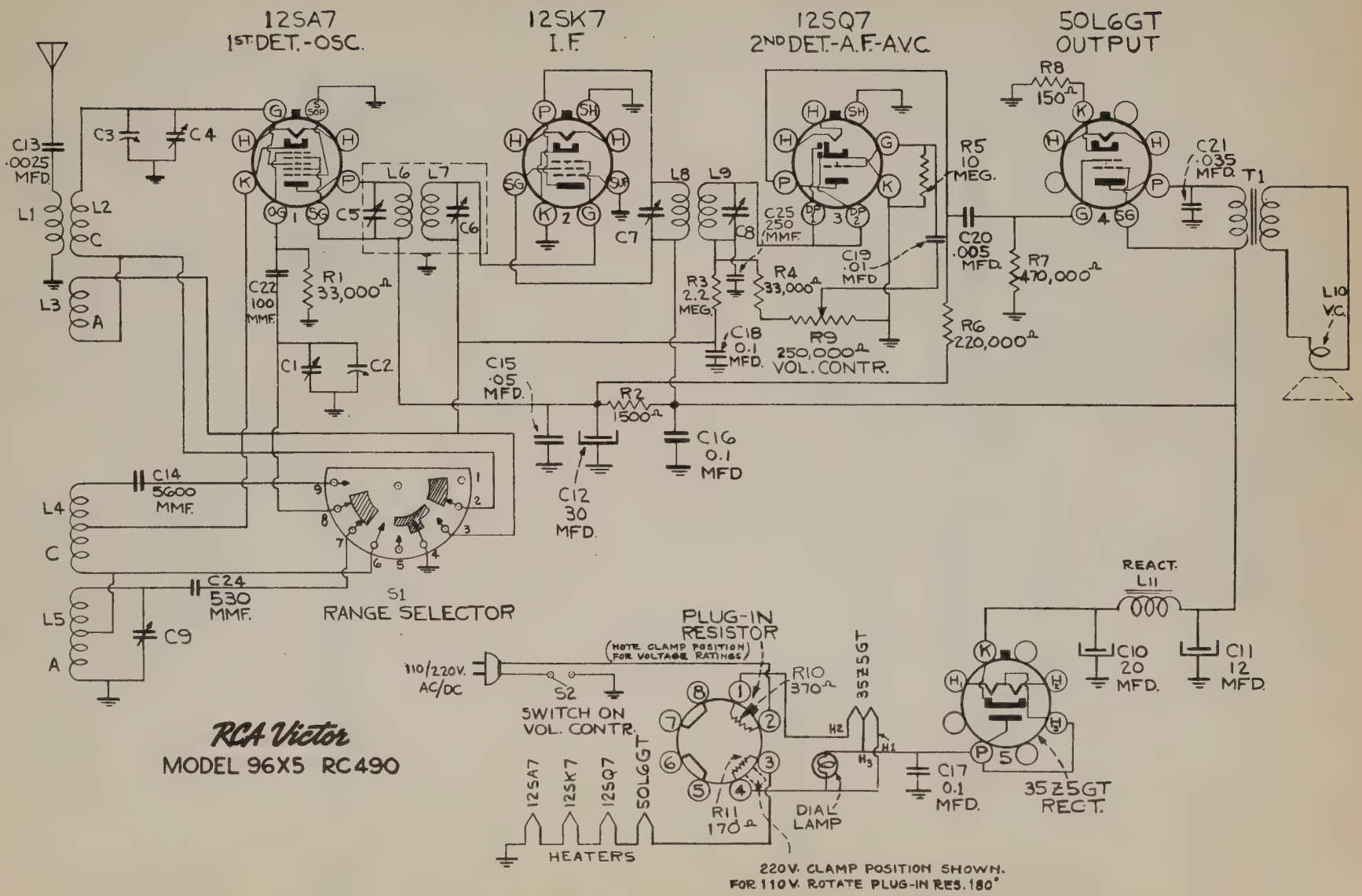
† Make test oscillator connection to lug on tuning condenser stator (oscillator section) in series with .01 mfd. condenser.

Note No. 1.—Accurately tune receiver to the 15.0 mc test oscillator signal. This signal will appear twice (14.09 and 15.0 mc) as dial is turned. Use the higher frequency setting of the tuning condensers (gang furthest out of mesh).

Note No. 2.—Oscillator tracks 455 kc above signal on all bands.



On some models 25L6 plate condenser is .025 mfd.



RCA Victor
MODEL 96X5 RC490

RCA VICTOR MODEL 96X5

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-490)		13428	Resistor—150 ohms, ½ watt (R8)	
			14499	Resistor—1,500 ohms, ½ watt (R2)	
			12454	Resistor—33,000 ohms, ½ watt (R1, R4)	
34458	Ballast—Ballast resistor tube		12264	Resistor—220,000 ohms, ½ watt (R6)	
34461	Capacitor—Electrolytic—comprising 1 section of 20 mfd. and 1 section of 12 mfd. (C10, C11)		12285	Resistor—470,000 ohms, ½ watt (R7)	
			12679	Resistor—2.2 megohm, ½ watt (R3)	
31379	Capacitor—Trimmer — comprising 1 section of 3-30 mmfd. and 1 section of 2-15 mmfd.		13601	Resistor—10 megohm, ½ watt (R5)	
			4669	Screw—No. 8-32 square head set screw for drum, Stock No. 32266	
12720	Capacitor—100 mmfd. (C22)				
12488	Capacitor—270 mmfd. (C25)		31482	Screw—No. 8-32 square head set screw for pulley, Stock No. 32541	
32492	Capacitor—530 mmfd. (C24)				
13895	Capacitor—5,600 mmfd. (C14)		34454	Shaft—Tuning condenser drive shaft	
34459	Capacitor—.0025 mfd. (C13)		31365	Socket—Dial lamp socket	
33584	Capacitor—.005 mfd. (C20)		31319	Socket—Tube socket	
4937	Capacitor—.01 mfd. (C19)		31418	Spring—Pointer drive cord spring	
5196	Capacitor—.035 mfd. (C21)		31615	Spring—Tuning condenser drive cord spring	
32787	Capacitor—.05 mfd. (C15)		34451	Switch—Range switch	
4839	Capacitor—0.1 mfd. (C16, C17, C18)		34453	Transformer—First i-f transformer	
34460	Capacitor—Electrolytic—comprising 1 section of 30 mfd. (C12)		32534	Transformer—Second i-f transformer	
			34458	Tube—Ballast resistor tube	
31378	Coil—Antenna coil		2917	Washer—"C" washer for shaft, Stock No. 34454	
34452	Coil—Oscillator coil		34457	Washer—Spring washer for shaft, Stock No. 34454	
32536	Condenser—Variable tuning condenser				
32545	Control—Volume control and power switch			MISCELLANEOUS ASSEMBLIES	
32634	Cord—Indicator pointer drive cord				
32266	Drum—Variable tuning condenser drive drum		34463	Dial—Glass dial scale	
32711	Indicator—Station selector pointer		31667	Escutcheon—Station selector escutcheon	
11765	Lamp—Dial lamp		31659	Knob—Tuning, range switch or volume control and power switch	
34497	Plate—Dial plate and pulleys assembled				
32541	Pulley—Drive pulley		31646	Spring—Retaining spring for knob, Stock No. 31659	
34458	Resistor—Ballast resistor tube				

RCA Victor

MODEL 98T2

Chassis No. RC-352D

Eight-Tube, Three-Band, AC-DC, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 31 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast ("A" band)	540-1,720 kc
Medium Wave ("B" band)	2.3-7.0 mc
Short Wave ("C" band)	7.0-22 mc

INTERMEDIATE FREQUENCY ..... 455 kc

Six Electric Tuning Positions

2 stations between approximately 550- 950 kc
2 stations between approximately 690-1,225 kc
2 stations between approximately 890-1,500 kc

TUBE COMPLEMENT

(1)	RCA-6K8	First-Detector—Oscillator
(2)	RCA-6K7	Intermediate-Frequency Amplifier
(3)	RCA-6H6	Second-Detector and A.V.C.
(4)	RCA-6J7	Audio Voltage Amplifier
(5)	RCA-25L6	Audio Power Amplifier
(6)	RCA-25Z6	Half-Wave Rectifier
(7)	RCA-6U5	Tuning Tube
(8)	RCA Stock No. 31577	Ballast Tube

Pilot Lamps ..... Mazda 47, 6.3 volts, .15 amp.

POWER OUTPUT

Undistorted	1.5 watts
Maximum	2.5 watts

POWER SUPPLY RATING

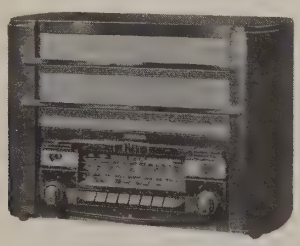
A-C Rating	105-125 volts, 25-60 cycles, 55 watts
D-C Rating	105-125 volts, 55 watts

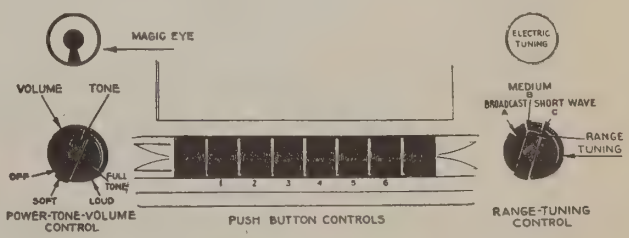
LOUDSPEAKER (PERMANENT-MAGNET DYNAMIC)

Diameter	6 inches
V. C. Impedance at 400 cycles	3 ohms

Dimensions	Height	Width	Depth
Cabinet	12¾ in.	18¾ in.	9⅜ in.
Chassis Base	2½ in.	13 in.	6½ in.

Over-all Chassis Height	6 in.
Tuning Drive Ratio	12 to 1
Shipping Weight (approx.)	25 lbs.





Miscellaneous Service Notes

Bias Cell.—The bias cell provides approximately 1-volt bias for the 1st audio grid. The cell should never be shorted, not measured with an ordinary voltmeter or other device that draws current. The cell may be checked by measuring the 1st-audio cathode current with a new tested 6J7 tube in this socket. The current should be approximately ½ milliampere. If it is appreciably greater than ½ mil., install a new bias cell.

Victrola Attachment.—Two screw-type terminals, numbered 1 and 2, are provided on the rear apron of the chassis for connection to a Victrola Attachment, such as the R-93, R-93B, etc. *(When A-C supply is available.)*

Care must be taken that these terminals are never connected in any way to the chassis, otherwise injury will result to the bias cell. To safeguard against this possibility, the following precautions should be observed in connecting the Victrola Attachment to the receiver.

Victrola Attachment with shielded cable.—If the shielded cable has a plug connector, remove the plug, connect the shielding to terminal 1, and connect the lead (inside the shielding) to terminal 2. Tape the shielding for a sufficient distance to prevent the possibility of it shorting against the chassis.

Victrola Attachment with twisted-pair cable.—Connect the low-side of the Attachment to terminal No. 1, and the high-side of the Attachment to terminal No. 2. (In some Attachments, the lead from the low-side is black, and the lead from the high-side is black-brown.)

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the position of the plug. For operation on a-c, a similar reversal of the plug may reduce hum.

First Edition

Trademarks "Victrola," "Magic Eye" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

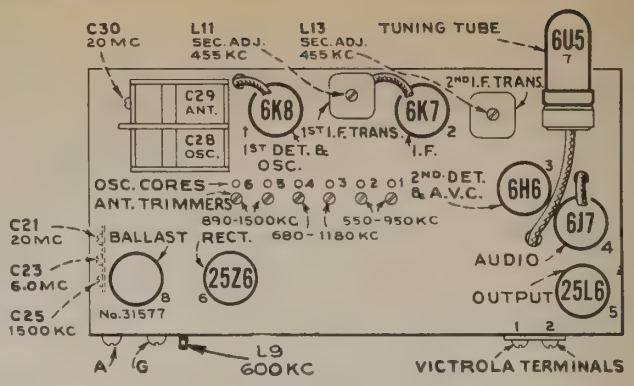
Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver ground terminal (G), and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The distance from the front of the chassis to the drum must not exceed ⅛-inch. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.



For additional details, refer to booklet "RCA Victor Receiver Alignment."

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio-dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	"A" band, Quiet Point between 550-750 kc	L12 and L13 (2nd I-F Transformer)
2	6K8 . det. grid cap, in series with .01 mfd.	455 kc		L10 and L11 (1st I-F Transformer)
3	Antenna Terminal, in series with 200 mmf.	600 kc	600 kc (150.5°) "A" band	L9
4		1,500 kc	1,500 kc (28°) "A" band	C25 (osc.) C30 (ant.)
5	Repeat steps 3 and 4.			
6	Antenna Terminal, in series with 400 ohms.	6 mc	6 mc (26.5°) "B" band	C23 (osc.)*
7		20 mc	20 mc (22°) "C" band	C21 (osc.)*
8	Follow "Adjustments for Electric Tuning."			

*Use minimum capacity peak if two peaks can be obtained, and rock gang condenser slightly while adjusting C23 and C21.

Note.—Oscillator tracks 455 kc above signal on all bands.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, move the dial indicator on the drive cable to the left-hand end mark on dial, with gang condenser fully meshed.

Adjustments for Electric Tuning

These models have eight push buttons. The left-hand button is a Victrola switch. The right-hand button connects the gang condenser for manual tuning. The other six buttons are for electric tuning of six different stations in the standard-broadcast range. The station buttons connect to separate magnetite-core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31031. Allow at least five minutes warm-up period before making adjustments.

The procedure is as follows:

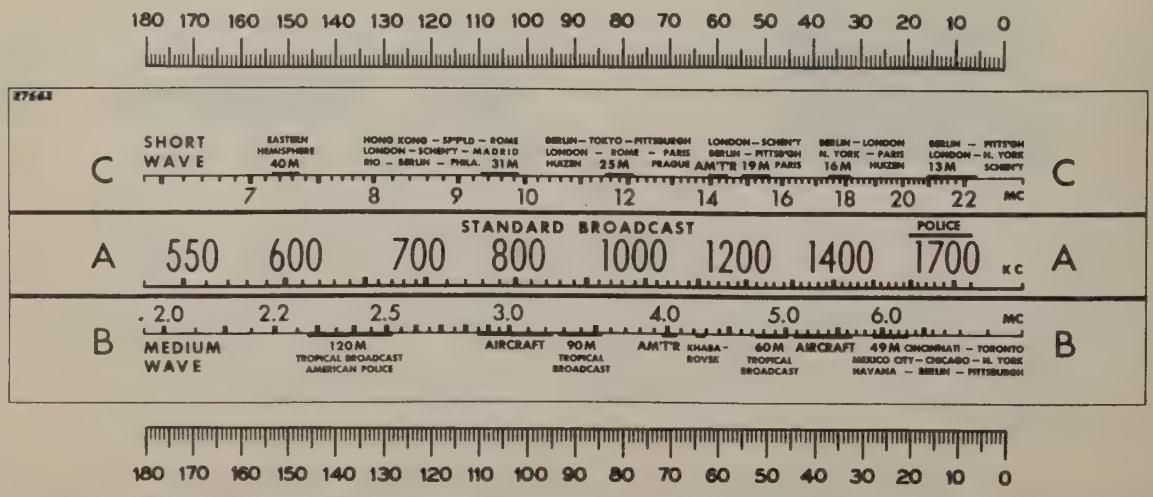
1. Make a list of the desired six stations, arranged in order from low to high frequencies.
2. Push in the dial-tuning button, and manually tune in the first station on the list.
3. Push in station button No. 1 (second from left) and adjust No. 1 oscillator core (L37) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until station is received.
4. Adjust No. 1 antenna trimmer (C36) for maximum output on this station.

Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.

5. Adjust for each of the remaining five stations in the same manner.
6. Make a final careful adjustment of the oscillator cores and antenna trimmers.

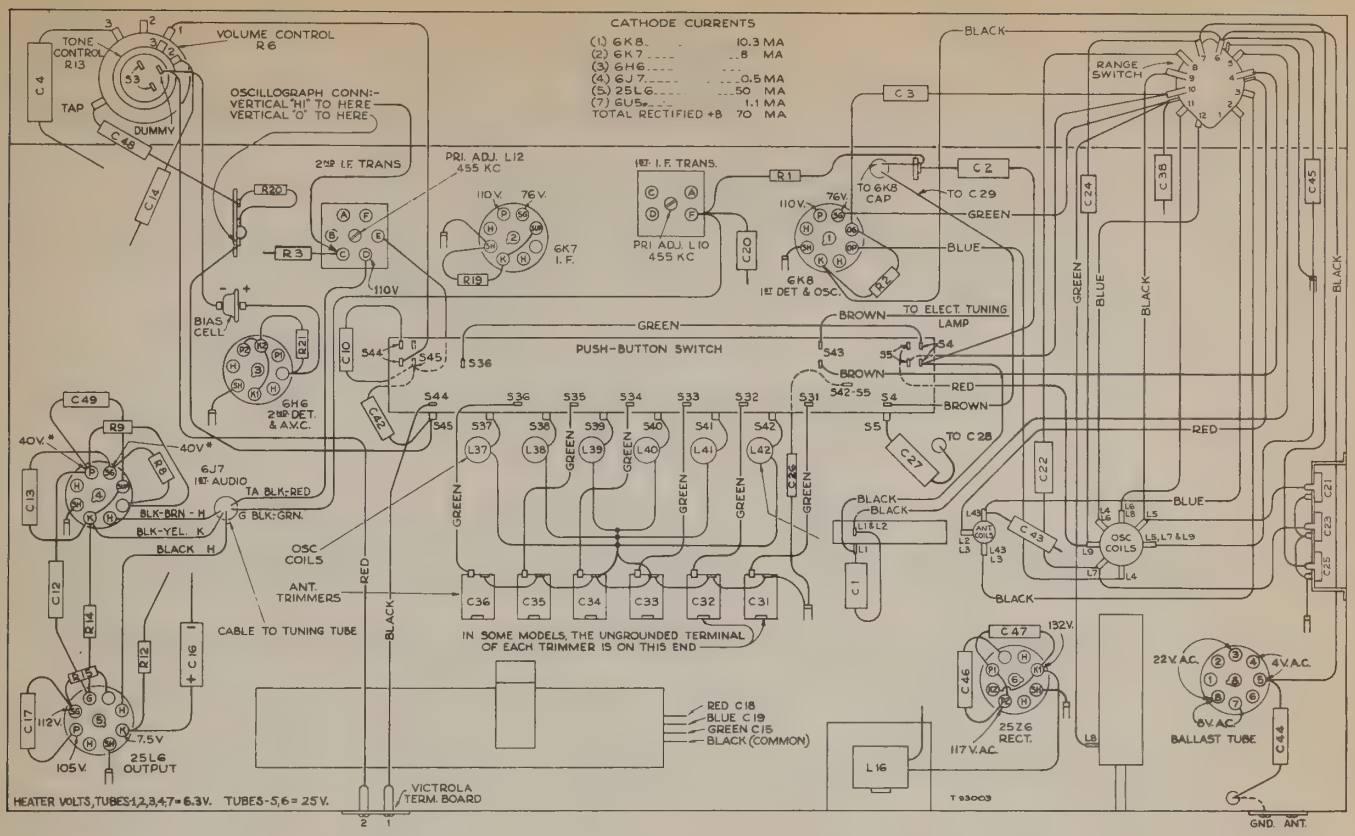
Precautionary Lead Dress.—

1. Dress the bias cell clear of all bus leads.
2. Leads from S43 must be dressed in front of range switch.
3. Blue lead from range switch to L5 must be short and clear of other leads.
4. Dress leads away from antenna and oscillator coils.
5. Leads across back of chassis must be dressed under electrolytic to prevent approaching Victrola jack.
6. Green lead from range switch to rear contact on oscillator coil must be dressed close to base.


180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
SHORT WAVE
EASTERN HEMISPHERE 40M
HONG KONG – SPFLD – ROME
LONDON – SCHENY – MADRID
RIO – BERLIN – PHILA. 31M
BERLIN – TOKYO – PITTSBURGH
LONDON – ROME – PARIS
HUIZEN 25M PRAGUE
LONDON – SCHENY
BERLIN – PITTSBGH
AM'TR 19M PARIS
BERLIN – LONDON
N. YORK – PARIS
16M HUIZEN
BERLIN – PITTSBGH
LONDON – N. YORK
13M SCHENY
7 8 9 10 12 14 16 18 20 22 MC
STANDARD BROADCAST
POLICE
550 600 700 800 1000 1200 1400 1700 KC
2.0 2.2 2.5 3.0 4.0 5.0 6.0 MC
MEDIUM WAVE
120M TROPICAL BROADCAST AMERICAN POLICE
AIRCRAFT
90M TROPICAL BROADCAST
AM'TR KHABAROVSK
60M TROPICAL BROADCAST
AIRCRAFT
49M CINCINNATI – TORONTO
MEXICO CITY – CHICAGO – N. YORK
HAVANA – BERLIN – PITTSBURGH
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

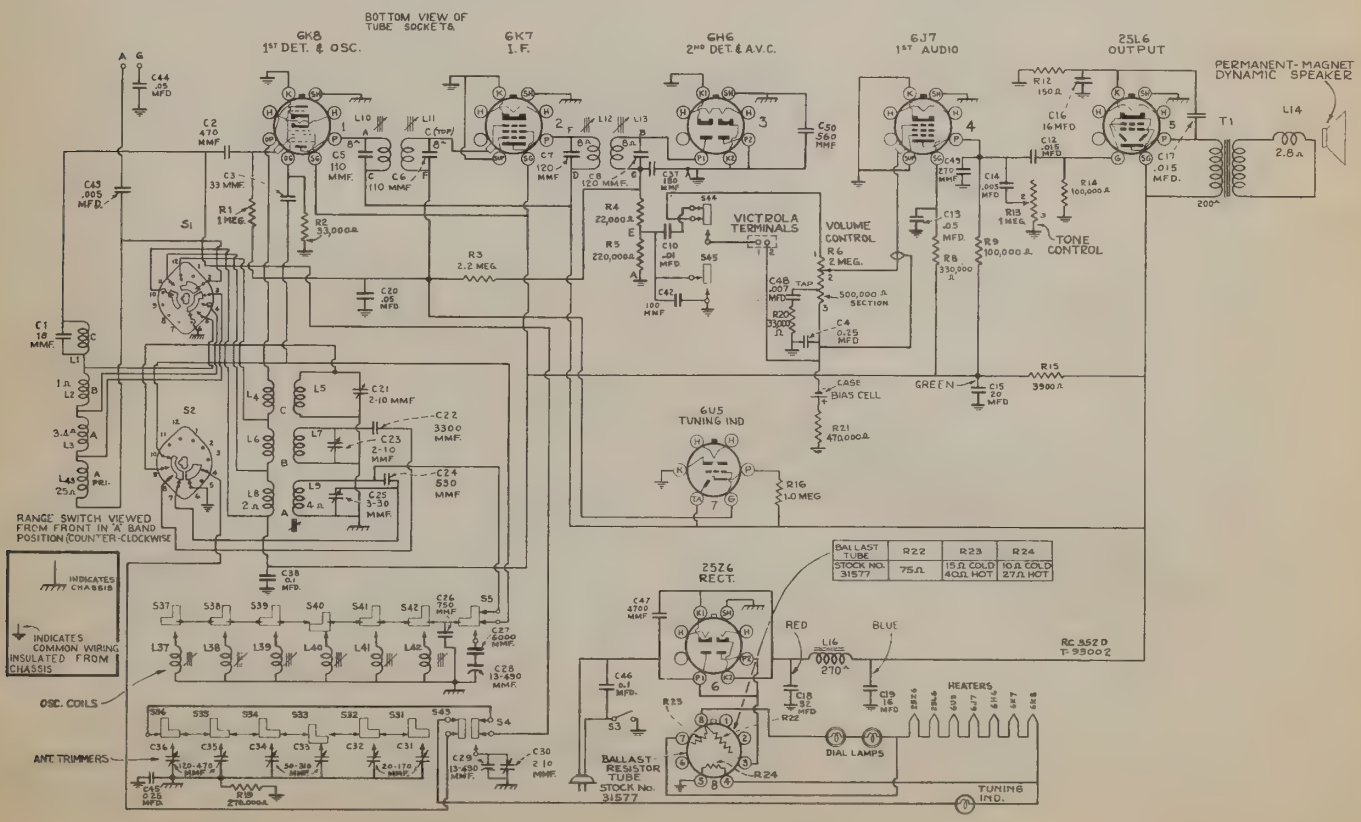
The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example; 28° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."



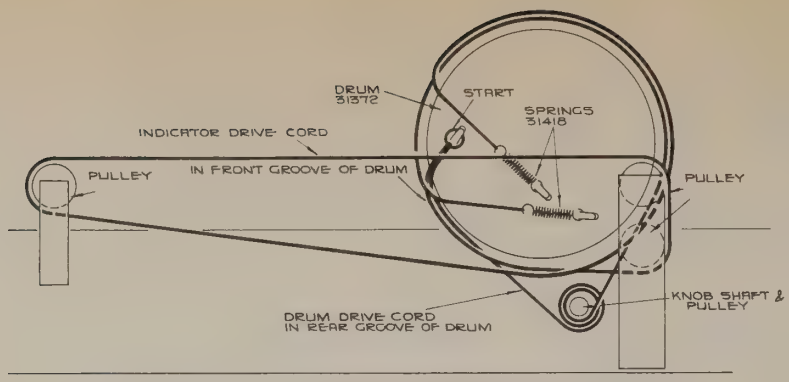
R-F Wiring Diagram and Socket Voltages

Measurements made to low-side of tone control unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within approximately ± 20% with 117-volt a-c supply. On d-c, voltages are approximately 10% lower, except heaters, which remain the same.

* **NOTE**: Values with star (*) are operating voltages in circuits with high series-resistance. The actual measured voltages will be lower, depending on the voltmeter loading.



BALLAST TUBE	R22	R23	R24
STOCK NO. 31577	75 Ω	15 Ω COLD 4 Ω HOT	10 Ω COLD 27 Ω HOT



DRUM SHOWN WITH GANG AT MAXIMUM CAPACITY

Arrangement of Drive Cords for Tuning Condenser and Dial Indicator

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	RECEIVER ASSEMBLIES
31577	Ballast—Ballast resistor tube (R22, R23, R24)
31767	Board—Antenna-ground terminal board
31579	Board—Phonograph terminal board
30752	Bracket—Bracket for holding Magic Eye tube
14338	Bushing—Variable condenser mounting bushing and screws
30766	Cap—Cap for Magic Eye
31400	Capacitor—Adjustable trimmer capacitor, two sections 2-10 mmfd. and one section 3-30 mmfd. (C21, C23, C25)
32486	Capacitor—Antenna coil trimmer capacitor bank —20-470 mmfd. (C31, C32, C33, C34, C35, C36)
12948	Capacitor—33 mmfd. (C3)
12722	Capacitor—18 mmfd. (C1)
12720	Capacitor—100 mmfd. (C42)
14262	Capacitor—109 mmfd. (C5, C6)
12404	Capacitor—120 mmfd. (C7, C8)
14712	Capacitor—180 mmfd. (C37)
12488	Capacitor—270 mmfd. (C49)
30433	Capacitor—470 mmfd. (C2)
32492	Capacitor—530 mmfd. (C24)
12537	Capacitor—560 mmfd. (C50)
31435	Capacitor—750 mmfd. (C26)
4881	Capacitor—3,300 mmfd. (C22)
12897	Capacitor—4,700 mmfd. (C47)
31405	Capacitor—6,000 mmfd. (C27)
5148	Capacitor—.007 mfd. (C48)
4838	Capacitor—.005 mfd. (C14, C43)
14393	Capacitor—.01 mfd. (C10)
11315	Capacitor—.015 mfd. (C12, C17)
4886	Capacitor—.05 mfd. (C13, C20, C44)
4839	Capacitor—0.1 mfd. (C38, C46)
12484	Capacitor—0.25 mfd. (C4, C45)
31323	Capacitor—16 mfd. (C16)
31576	Capacitor—Comprising one 32 mfd., one 20 mfd., and one 16 mfd. section (C15, C18, C19)
31581	Cell—Bias cell
31382	Clip—Mounting clip for coils and cores on oscillator bank
32493	Coil—Antenna coil (L1, L2, L3, L43)
31951	Coil—Oscillator coil (L4, L5, L6, L7, L8, L9, C24)
31385	Coil—Push button oscillator coil (L37, L38)
32487	Coil—Push button oscillator coil (L39, L40)
31383	Coil—Push button oscillator coil (L41, L42)
31369	Condenser—2-gang variable tuning condenser (C28, C29, C30)
5119	Connector—3-contact female connector plug for reproducer cable
32668	Control—Volume control, tone control, and on-off switch (R6, R13, S3)
32634	Cord—Drum drive cord
32635	Cord—Indicator pointer drive cord
31386	Core—Adjustable core and stud assembly for oscillator bank
12800	Core—Adjustable core and stud for oscillator coil, Stock No. 31951
31372	Drum—Variable condenser drive cord drum and calibrator
31580	Holder—Bias cell holder
32552	Indicator—Dial pointer
31480	Lamp—Dial lamp (Mazda No. 47)
32670	Plate—Dial color plate, pointer slide, and lamp brackets assembled

STOCK No.	DESCRIPTION
31373	Pulley—Drive cord pulley
5066	Reactor (L16)
31577	Resistor—Ballast resistor (R22, R23, R24)
30880	Resistor—150 ohms, ½ watt (R12)
30694	Resistor— 3,900 ohms, ½ watt (R15)
14284	Resistor—22,000 ohms, 1/10 watt (R4)
12454	Resistor—33,000 ohms, ¼ watt (R2, R20)
14560	Resistor—100,000 ohms, ¼ watt (R9, R14)
11398	Resistor—220,000 ohms, 1/10 watt (R5)
12199	Resistor—270,000 ohms, ¼ watt (R19)
14983	Resistor—330,000 ohms, ¼ watt (R8)
12285	Resistor—470,000 ohms, ¼ watt (R21)
13730	Resistor—1 meg., ¼ watt (R1)
12013	Resistor—1 meg., 1/10 watt (R16)
12679	Resistor—2.2 meg., ¼ watt (R3)
14343	Retainer—Drive cord pulley retainer
14887	Retainer—Retainer for drive cord pulley
4669	Screw—No. 8-32 square head set screw for drum, Stock No. 31372
32671	Shaft—Station selector knob shaft and pulley
12110	Shield—Radiotron shield cap
31365	Socket—Dial lamp socket
13871	Socket—Magic Eye socket
31251	Socket—Tube socket
31970	Spring—Tension spring for station selector push button switch latch bar
31418	Spring—Indicator or drum drive cord tension spring
31370	Switch—Push button selector switch (S4, S5, S31, S32, S33, S34, S35, S36, S37, S38, S39, S40, S41, S42, S43, S44, S45)
33009	Switch—Range switch (S1, S2)
14376	Transformer—First i-f transformer (L10, L11, C5, C6)
14283	Transformer—Second i-f transformer (L12, L13, C7, C8, C37, R4, R5)
31577	Tube—Ballast resistor tube (R22, R23, R24)
	SPEAKER ASSEMBLIES (84307-1)
31665	Cone—Speaker cone and voice coil (L14)
5118	Plug—3-contact male plug for speaker
31664	Speaker complete
31666	Transformer—Output transformer (T1)
	MISCELLANEOUS ASSEMBLIES
31397	Button—Station selector push button
31456	Cover — 8-protective covers for push button markers
32673	Dial—Station selector dial scale (glass)
32674	Escutcheon—Station selector escutcheon less dial scale and push buttons
31355	Knob—Range switch knob
14359	Knob—Station selector knob
31391	Knob—Tone control knob
30773	Knob—Volume control knob
31458	Marker—"Dial Tuning" push button marker
31457	Marker—"Record Player" push button marker
31589	Marker—Station call letters push button markers
4982	Spring—Retaining spring for knob, Stock No. 14359
30330	Spring—Retaining spring for knob, Stock No. 31391
14270	Spring—Retaining spring for knob, Stock Nos. 30773 and 31355

RCA Victor

MODELS 4QB and 4QB4

Chassis No. RC-440 and RC-440A

Four-Tube, Three-Band, Battery-Operated Receivers

and

Model CV-111 (RS-95) A-C Power Unit

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGES

Model 4QB	
Standard Broadcast ("A" Band)	540-1,720 kc (555-174 m)
Medium Wave ("B" Band)	2.3-7.0 mc (130-42.8 m)
Short Wave ("C" Band)	7.0-22 mc (42.8-13.6 m)
Model 4QB4	
Standard Broadcast ("A" Band)	540-1,720 kc (555-174 m)
Short Wave ("C" Band)	5.8-18 mc (51.7-16.6 m)
Long Wave ("X" Band)	145-385 kc (2069-779 m)

INTERMEDIATE FREQUENCY ..... 455 kc

RCA TUBE COMPLEMENT

(1) RCA-1A7-G ..... 1st Det.—Oscillator
(2) RCA-1N5-G ..... I-F Amplifier
(3) RCA-1H5-G .. 2nd Det., A.F., and A.V.C.
(4) RCA-1C5-G ..... Power Output

POWER OUTPUT RATING

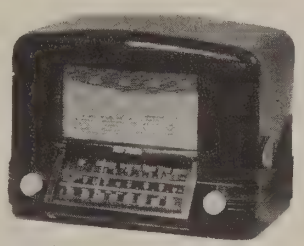
	Undistorted	Maximum
With Battery Supply..	0.13 watt	0.23 watt
With A-C Supply.....	0.20 watt	0.46 watt

LOUDSPEAKER

Type ..... 5-inch permanent-magnet dynamic
Voice-coil Impedance .... 3 ohms at 400 cycles

BATTERIES REQUIRED

One 1½-volt "A" battery, and
Two 45-volt "B" batteries, or
One 1½-90-volt battery pack.



Models 4QB and 4QB4

BATTERY DRAIN

"A"	.25 amp.
"B"	10.5 ma.

DIMENSIONS (inches)

	Height	Width	Depth
Cabinet	9¾	13½	8⅞
Chassis Base	2¾	12	5¼

Chassis Over-all Height ..... 7 inches
Tuning Drive Ratio ..... 18 to 1

CV-111 A-C POWER SUPPLY UNIT

Power Rating ..... 105-125/200-250 volts, 50-60 cycles, 65 watts
Rectifier Tube RCA-5T4
Ballast Resistor Tube ..... Type 86892-3
Dial Lamp .... Mazda 44, 6.3 volts, 0.25 amp.
Dimensions (inches) ..... 5 x 3¼ x 6¾
Net Weight ..... 5 lbs.

Miscellaneous Data

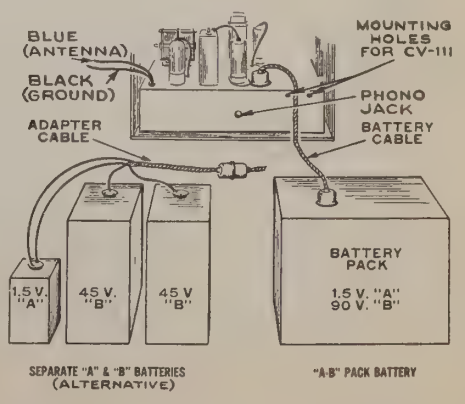
Battery Connections:

A four-wire cable with a plug at each end is provided for making connection from the 8-prong connector on chassis to a plug-in 1½-90 volt "A-B" battery pack.

When separate "A" and "B" batteries are used, it is necessary to use an adapter cable with a socket on one end and three plugs on the other end, connected as shown in the accompanying sketch.

With separate "A" and "B" batteries that have terminals instead of plug-in connectors, remove the three plugs on the adapter cable and connect the leads to the battery terminals, following the color code shown in the schematic diagram.

Separate "A" and "B" batteries or an "A-B" battery pack may be used.



Victrola Attachment:

A jack is provided on the rear of chassis for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.

First Edition

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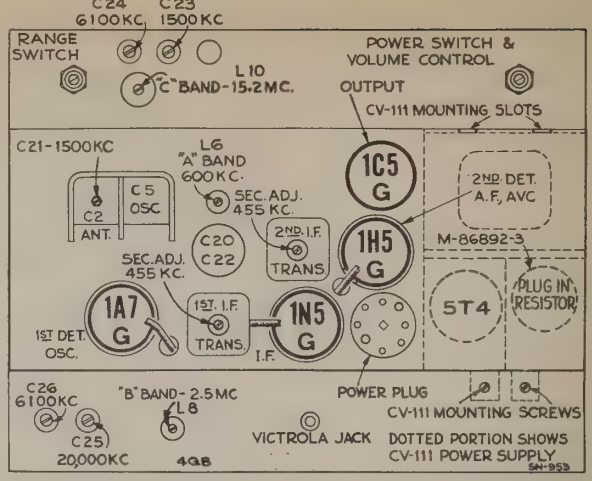
Printed in U. S. A.

Model 4QB Alignment Procedure

(Refer to section on "General Alignment Data")

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output—
1	1N5-G I-F grid cap, in series with .01 mfd.	455 kc	"A" band, quiet point at high-frequency end	L14 and L13 (2nd I-F Trans.)
2	1A7-G 1st-Det. grid cap, in series with .01 mfd.			L12 and L11† (1st I-F Trans.)
3	Antenna lead, in series with 200 mmfd.	1,500 kc	1,500 kc (152.5°) "A" band	Preset L6 (osc.) core 5/16-in. out. Peak C23 (osc.) and C21 (ant.)
4		600 kc	600 kc (33°) "A" band	L6 (osc.)**
5		Repeat steps 3 and 4		
6		6.1 mc	6.1 mc (151°) "B" band	Preset L8 (osc.) core $\frac{1}{8}$-in. out. Peak C24 (osc.)* and C26 (ant.)
7		2.5	2.5 mc (29.5°) "B" band	L8 (osc.)**
8		Repeat steps 6 and 7		
9	Antenna lead, in series with 300 ohms	15.2 mc	15.2 mc (122°) "C" band	L10 (osc.)
10		20 mc	20 mc (155.5°) "C" band	C25 (ant.)†† Rock gang
11	Antenna lead, in series with 200 mmfd.	1,500 kc	1,500 kc (152.5 kc) "A" band	C23 (osc.)



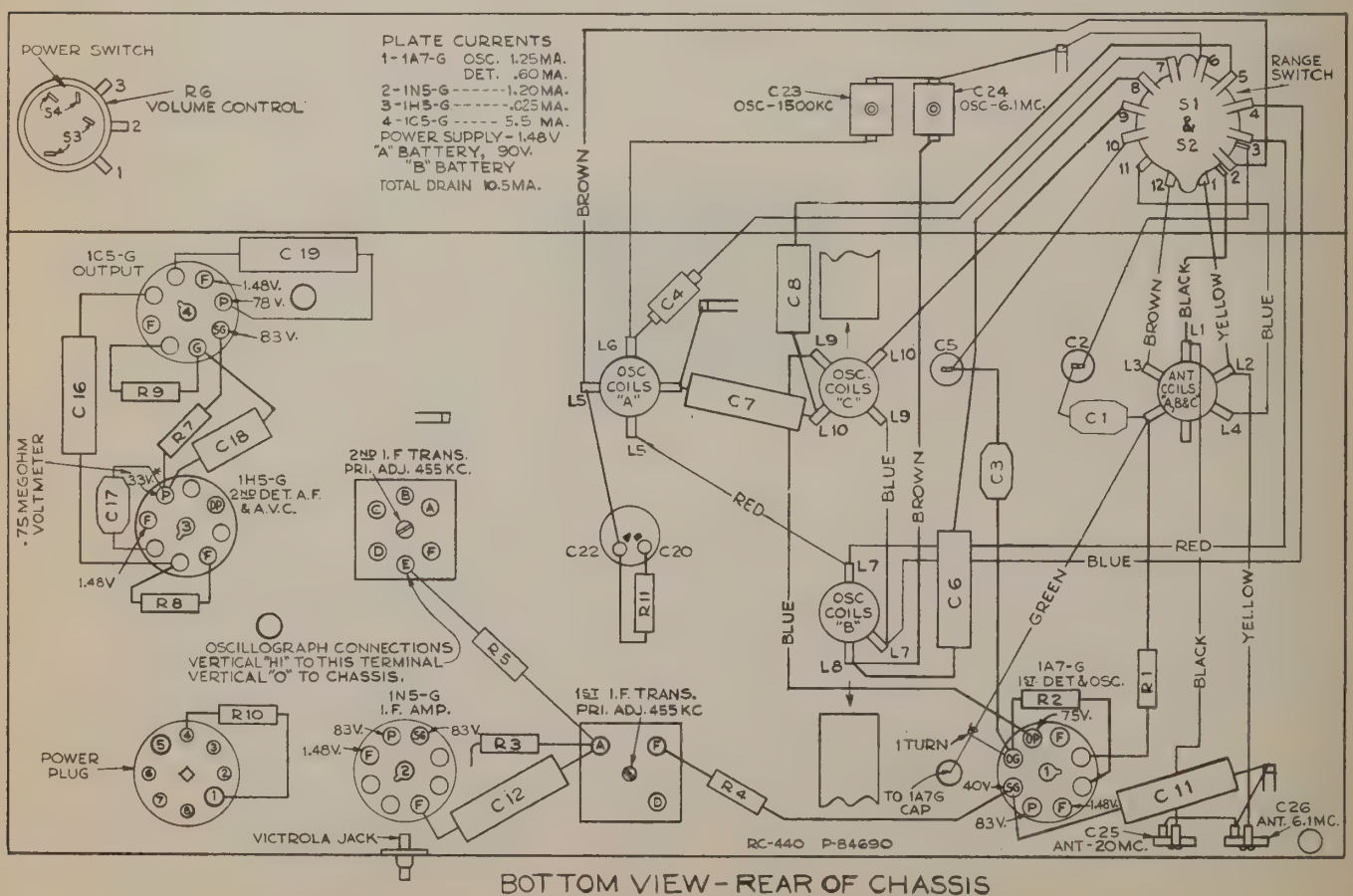
Model 4QB Top View

*Use minimum capacity peak if two peaks can be obtained.

**Rock gang slightly for peak output.

†Do not readjust L13 or L14 when test-osc. is applied to 1A7-G grid.

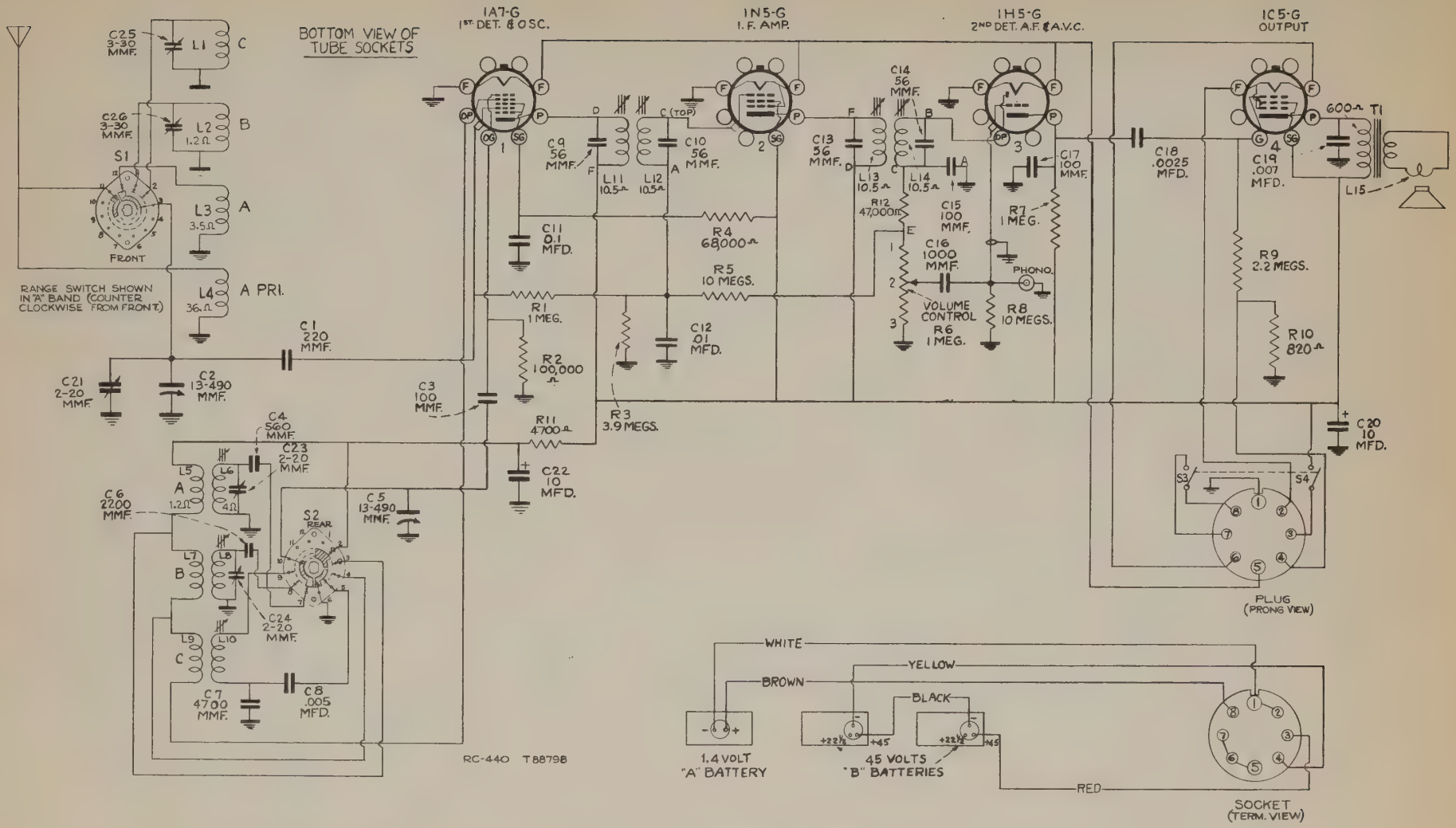
††Use maximum capacity peak if two peaks can be obtained.



BOTTOM VIEW - REAR OF CHASSIS

Model 4QB R-F Wiring Diagram and Socket Voltages

Voltages shown above are for battery operation.



Model 4QB Schematic Diagram

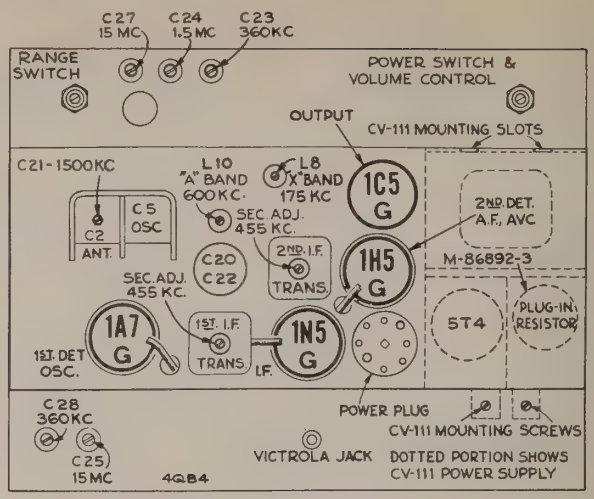
Precautionary Lead Dress:

1. Dress C3 (100 mmfd.) edgewise to chassis.
2. Dress the 1A7-G grid cap lead clear of chassis.
3. Dress green wire from C2 (antenna section of gang) to range switch away from chassis and other wires.
4. Dress blue lead from terminal "E" of 2nd I-F transformer around terminal "D", away from the 1H5-G and 1C5-G sockets, and close to the chassis.
5. Dress C16 (1,000 mmfd.) from grid of 1H5-G tube to volume control, and the green lead to the 1H5-G grid cap away from other wires.
6. Dress the red wire from the power plug to the power switch on the volume control away from the 1H5-G socket.
7. Blue lead from "C" band oscillator coil to 1A7-G No. 6 contact must be dressed away from chassis.
8. All tube shields must be tight.

Model 4QB4 Alignment Procedure

(Refer to section on "General Alignment Data")

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	1N5-G I-F grid cap, in series with .01 mfd.	455 kc	"A" Band, Quiet Point at high-frequency end	L14 and L13 (2nd I-F Trans.)
2	1A7-G 1st-Det. grid cap, in series with .01 mfd.			L12 and L11 (1st I-F Trans.)†
3	Antenna lead, in series with 200 mmfd.	1,500 kc (200 m)	1,500 kc (152.5°) "A" Band	Preset L10 (osc.) core 5/16-in. out Peak C24 (osc.) and C21 (ant.)
4		600 kc (500 m)	600 kc (33°)	L10 (osc.)**
5		Repeat steps 3 and 4.		
6		360 kc (833 m)	360 kc (161°) "X" Band	Preset L8 (osc.) core ⅜-in. out Peak C23 (osc.) and C28 (ant.)
7		175 kc (1,710 m)	175 kc (55°) "X" Band	L8 (osc.)**
8		Repeat steps 6 and 7.		
9	Antenna lead, in series with 300 ohms	15 mc	15 mc (146°) "C" Band	C27 (osc.)* C25 (ant.)††
10	Antenna lead, in series with 200 mmfd.	1,500 kc (200 m)	1,500 kc (152.5°) "A" Band	C24 (osc.)



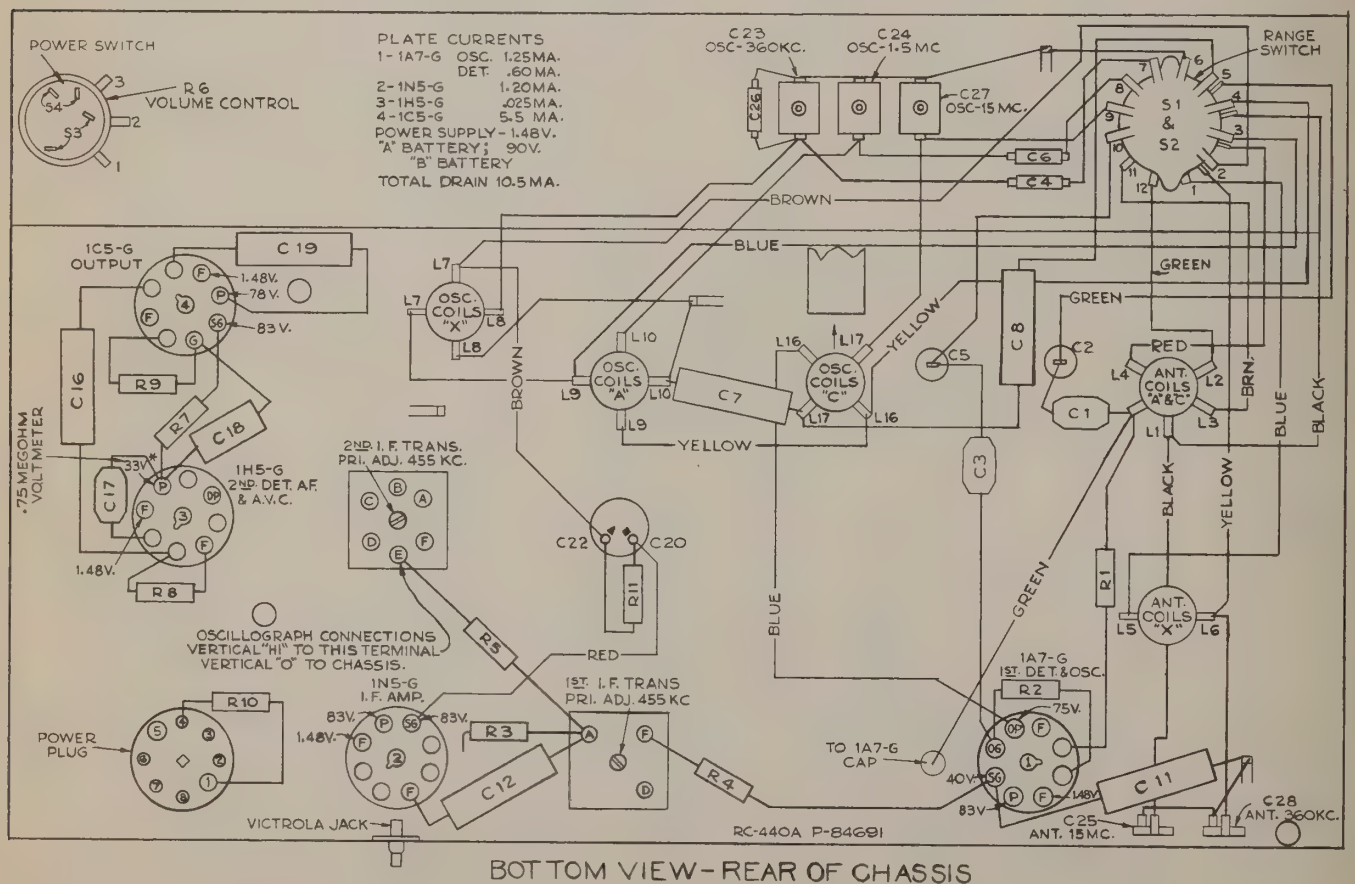
Model 4QB4 Top View

*Use minimum capacity peak if two peaks can be obtained.

**Rock gang slightly for peak output.

†Do not readjust L13 or L14 when test-osc. is applied to 1A7-G grid.

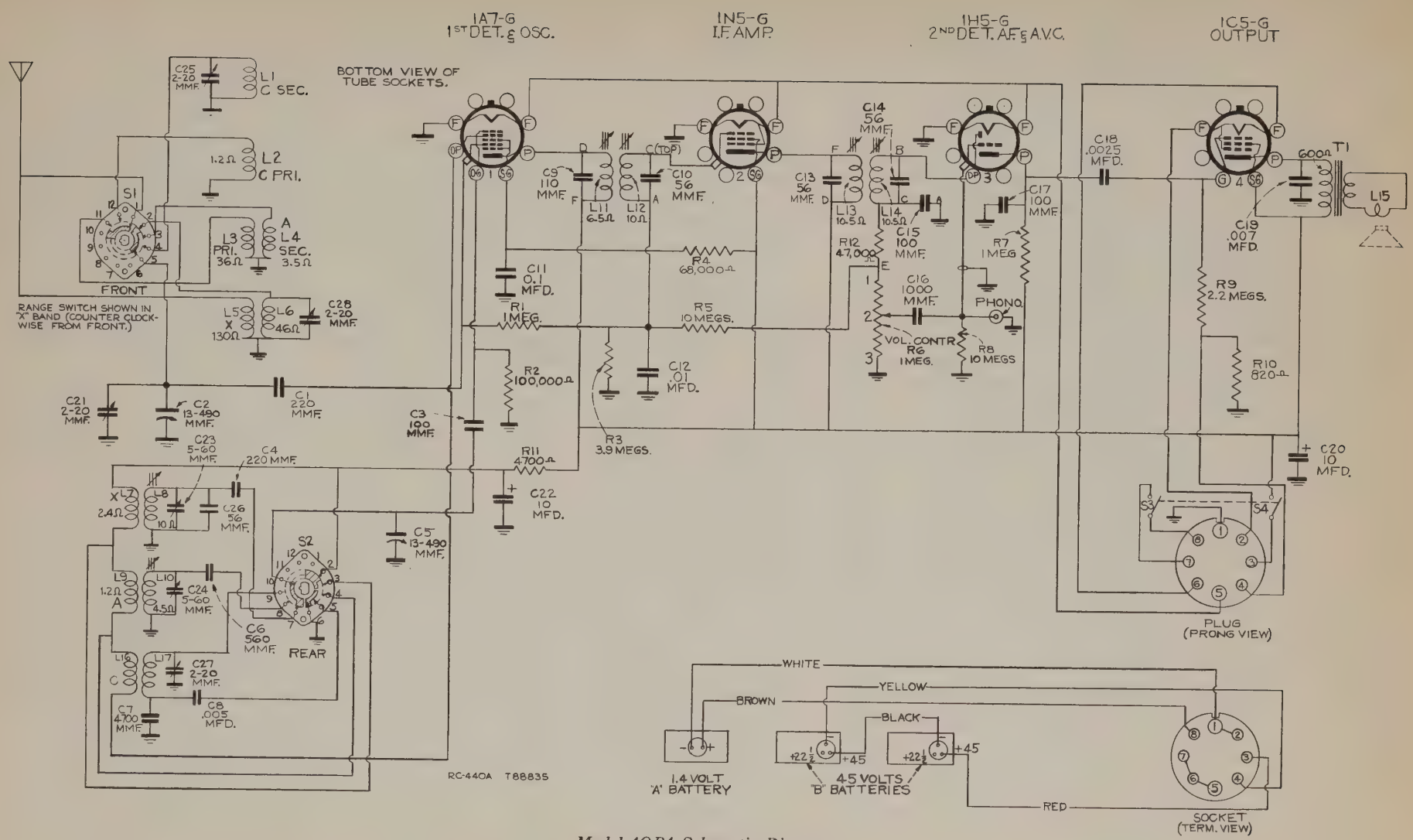
††Use maximum capacity peak if two peaks can be obtained.



BOTTOM VIEW - REAR OF CHASSIS

Model 4QB4 R-F Wiring Diagram and Socket Voltages

Voltages shown above are for battery operation.



Model 4QB4 Schematic Diagram

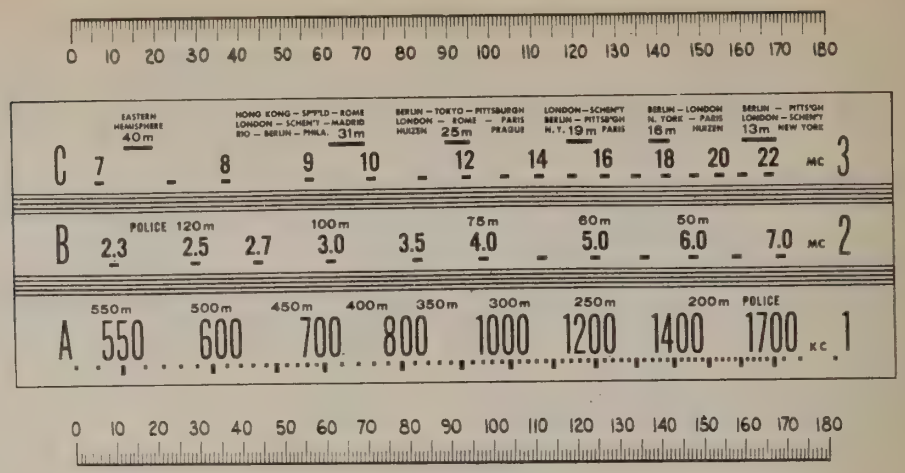
Precautionary Lead Dress:

1. Dress C3 (100 mmfd.) edgewise to chassis.
2. Dress the 1A7-G grid cap lead clear of chassis.
3. Dress green wire from C2 (antenna section of gang) to range switch away from chassis and other wires.
4. Dress blue lead from terminal "E" of 2nd I-F transformer around terminal "D", away from the 1H5-G and 1C5-G sockets, and close to the chassis.
5. Dress C16 (1,000 mmfd.) from grid of 1H5-G tube to volume control, and the green lead to the 1H5-G grid cap away from other wires.
6. Dress the red wire from the power plug to the power switch on the volume control away from the 1H5-G socket.
7. Blue lead from "C" band oscillator coil to 1A7-G No. 6 contact must be dressed away from chassis.
8. All tube shields must be tight.

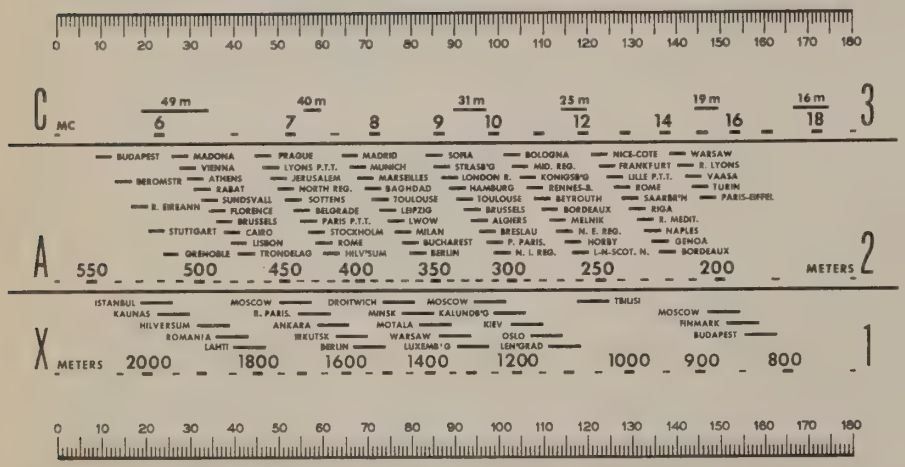
General Alignment Data for Models 4QB and 4QB4

(Refer to specific "Alignment Procedure" for each model)

At Right—
Model 4QB
Dial and Calibration Scales



At left—
Model 4QB4
Dial and Calibration Scales



Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment. — If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the ground terminal, and keep the output as low as possible to avoid a-v-c action.

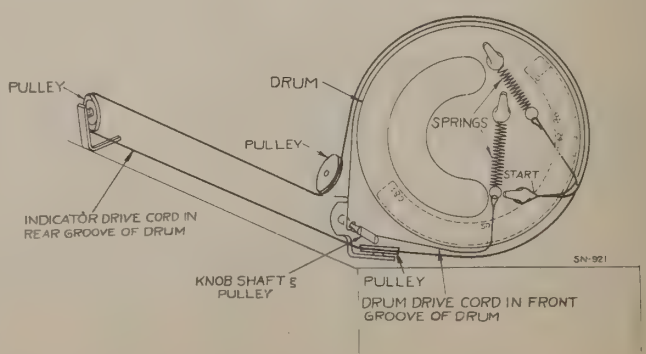
Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the rear of the drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 45 degree mark on drum scale should be in an approximately horizontal position when the plates are fully meshed. The distance from the edge of the chassis to the drum must not exceed $\frac{3}{8}$-inch. The drum is held to the shaft by means of a set screw, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang condenser frame, and bend the wire so that it points to the "0" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, (last mark at end of "A" scale) and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

For additional details, refer to booklet "RCA Victor Receiver Alignment."

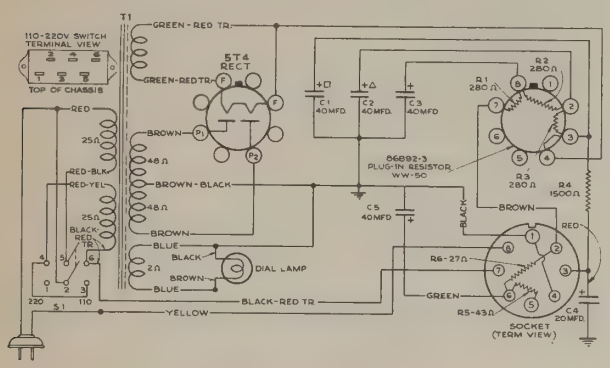


Arrangement of Drive Cords for Tuning Condenser and Dial Indicator
(Drum shown with gang in maximum-capacity position)

CV-111 A-C Power Supply Unit

Models 4QB and 4QB4 may be operated on 105-125/200-250 volts, 50-60 cycle a-c power supply, by installing a CV-111 power supply unit on the chassis, as follows:

1. Remove the battery cable plug from the power plug on chassis.
2. Set the line power switch (on side of CV-111) to the correct position for the a-c voltage that is to be used.
3. Place the CV-111 on top of the radio chassis as shown in dotted lines in the top view. Press the dial light clip on the projection at low-frequency end of dial assembly. Insert the 8-prong socket (on cable from CV-111) into the power plug on chassis.
4. Fasten the power unit to the chassis. The front of the unit has two projections which fit into slots on the front of the chassis. Two projections on the rear of the unit have holes for fastening to the rear of the chassis with self-tapping screws.
5. Caution: Before connecting to the a-c supply, make certain that all tubes are firmly seated in their sockets. Always disconnect the a-c supply before removing or replacing tubes.
6. Reverse the a-c power plug for minimum hum.



Model CV-111 Power Unit

Socket Voltages, with CV-111 Power Supply Unit

(Line Supply Voltage, 117, or 234 volts)

Tube	1A7-G		1N5-G	1H5-G	1C5-G
Function	1st-Det.	Osc.	I. F.	2nd Det., A. F.	Output
Filament Voltage	1.3		1.3	1.3	1.28
Plate Voltage	95	85	95	40**	82
Screen Voltage	45		95		95
Plate Mils.	0.4	1.5	1.5	.03	9
Screen Mils.	.7		.35		1.75
Bias					6.1

Total "B" current, 15 mils.
Total filament current, 146 mils.
**With 750,000 ohm voltmeter.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-440, Model 4QB) (RC-440A, Model 4QB4)
32832	Bracket—Drive bracket pulleys, tuning knob shaft complete
32834	Bracket—Pulley and bracket
32830	Capacitor—Trimmer capacitor—2 sections 2-20 mmfd. each. (Model 4QB C23, C24) (Model 4QB4 C25, C28)
31292	Capacitor—Trimmer capacitor—2 sections 3-30 mmfd. each (Model 4QB C25, C26)
33788	Capacitor—Trimmer capacitor—3 sections 2 of 5-60 mmfd. each and 1 section of 2-20 mmfd. each. (Model 4QB4 C23, C24, C27)
12723	Capacitor—56 mmfd. (Model 4QB4 C26)
30949	Capacitor—56 mmfd. (C9, C10, C13, C14 Model 4QB) (C10, C13, C14, Model 4QB4)
12629	Capacitor—56 mmfd. (Model 4QB4 C10)
12720	Capacitor—100 mmfd. (C3, C17)
14262	Capacitor—109 mmfd. (Model 4QB4 C9)
32238	Capacitor—110 mmfd. (C15)
12694	Capacitor—220 mmfd. (C1, C4) (C4 in Model 4QB4 only)
31433	Capacitor—560 mmfd. (C4 in Model 4QB, C6 in Model 4QB4)
12635	Capacitor—1,000 mmfd. (C16)
12951	Capacitor—2,200 mmfd. (Model 4QB C6)
31399	Capacitor—4,700 mmfd. (C7)
33584	Capacitor—.005 mfd. (C8)
5148	Capacitor—.007 mfd. (C19)
4937	Capacitor—.01 mfd. (C12)
4839	Capacitor—0.1 mfd. (C11)
33790	Capacitor—Comprising 2 sections of 10 mfd. each (C20, C22)
32821	Coil—Antenna coil—A, B, C bands—(Model 4QB L1, L2, L3, L4)
32706	Coil—Antenna coil—A, C band (Model 4QB4 L1, L2, L3, L4)
32823	Coil—Antenna coil—X band (Model 4QB4 L5, L6)
32148	Coil—Oscillator coil—"A" band (Model 4QB L5, L6) (Model 4QB4 L9, L10)
33784	Coil—Oscillator coil—"B" band (Model 4QB L7, L8)
33785	Coil—Oscillator coil—"C" band (Model 4QB L9, L10)
33787	Coil—Oscillator coil—"C" band (Model 4QB4 L16, L17)
33786	Coil—Oscillator coil—"X" band (Model 4QB4 L7, L8)
32817	Condenser—Variable tuning condenser (C2, C5, C21)
33780	Control—Volume control and switch (R6, S3, S4)
32634	Cord—Condenser drive cord
32635	Cord—Indicator drive cord
32713	Core—Core and stud for oscillator coil (Model 4QB) ("B" band)
32835	Drum—Drive cord drum
5119	Plug—3-contact female for speaker cable
30568	Plug—4-contact male for power cable
33969	Plug—8-contact female for power cable
33789	Plug—8-prong male power input plug
14076	Resistor—820 ohms, ½ watt (R10)
30146	Resistor—4,700 ohms, ½ watt (R11)
5132	Resistor—47,000 ohms, 1/10 watt (R12)
13715	Resistor—68,000 ohms, ½ watt (R4)
14560	Resistor—100,000 ohms, ½ watt (R2)
13730	Resistor—1 meg., ½ watt (R1, R7)
12679	Resistor—2.2 meg., ½ watt (R9)
13167	Resistor—3.9 meg., ½ watt (R3)
13601	Resistor—10 meg., ½ watt (R5, R8)
30340	Retainer—Drive bracket shaft retainer
32833	Shaft—Tuning knob shaft retainer and pulley
14278	Socket—Phonograph input socket and plate
31319	Socket—Tube socket
31418	Spring—Spring for indicator drive and condenser drive cords
33781	Switch—Range switch (Model 4QB S1, S2)
33782	Switch—Range switch (Model 4QB4 S1, S2)
32263	Transformer—First i-f transformer (Model 4QB L11, L12, C9, C10)
14261	Transformer—First i-f transformer (Model 4QB4 L11, L12, C9, C10)
32825	Transformer—Second i-f transformer (L13, L14, C13, C14, C15, R12)
	SPEAKER ASSEMBLIES (84556-2)
33804	Cone—Cone complete with voice coil, center suspension and dust screen—centered and assembled in metal housing (L15)
5118	Plug—3-contact male plug for speaker
33791	Speaker—Complete
33805	Transformer—Output transformer (T1)
	MISCELLANEOUS ASSEMBLIES
32845	Bracket—Dial mounting bracket and lamp bracket assembly—less pointer and pointer slide rods

(continued on next page)

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
32837	Dial—Glass dial scale (Model 4QB)			CV-111 POWER SUPPLY UNIT	
33844	Dial—Glass dial scale (Model 4QB4)		33813	Ballast—Ballast resistor tube—Type 86892-3 (R1, R2, R3)	
34340	Knob—Range switch knob—black		33968	Capacitor—Electrolytic—1 section of 20 mfd. and 1 section of 40 mfd. (C4, C5)	
34341	Knob—Range switch knob—ivory		33810	Capacitor—Electrolytic, 3 sections 40 mfd. each (C1, C2, C3)	
34342	Knob—Range switch knob—maroon		11891	Lamp—Pilot lamp	
33085	Knob—Tuning knob—black		33813	Resistor—Ballast resistor tube—Type 86892-3 (R1, R2, R3)	
32839	Knob—Tuning knob—brown		12453	Resistor—27 ohms, ½ watt (R6)	
33091	Knob—Tuning knob—ivory		33970	Resistor—43 ohms, flexible (R5)	
33093	Knob—Tuning knob—maroon		14499	Resistor—1,500 ohms, ½ watt (R4)	
33943	Knob—Volume control knob—black		33969	Socket—8-contact female socket for power supply cable	
33944	Knob—Volume control knob—ivory		31364	Socket—Pilot lamp socket	
33945	Knob—Volume control knob—maroon		31319	Socket—Tube socket	
32208	Plug—2-contact male plug for battery cable		32827	Switch—Voltage change switch (S1)	
12827	Plug—3-contact male plug for battery cable ("B" leads)		33783	Transformer—Power transformer 105-120 and 200-240 volts, 50-60 cycle (T1)	
30568	Plug—4-contact male plug for battery cable		33813	Tube—Ballast resistor tube—Type 86892-3 (R1, R2, R3)	
32847	Pointer—Dial pointer, carriage and clip				
32846	Rod—Pointer slide rod				
30567	Socket—4-contact female socket for battery cable				
33969	Socket—8-contact female socket for battery cable				
14270	Spring—Retaining spring for knobs				

RCA Victor

MODELS 7QB and 7QBK

Chassis No. RC-496

Seven-Tube, Three-Band, Superheterodyne Receivers

and

Power Units CV-110 and MI-8122

TECHNICAL INFORMATION AND SERVICE DATA

—1939—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast ("A" Band).. 540-1,720 kc (555-174 m)
Medium Wave ("B" Band) ..... 2.3-7.0 mc (130-42.8 m)
Short Wave ("C" Band) ..... 7.0-22 mc (42.8-13.6 m)

INTERMEDIATE FREQUENCY..... ..... 455 kc

RADIOTRON COMPLEMENT

(1) RCA-6S7-G ..... R-F Amplifier
(2) RCA-6SA7 ..... 1st-Detector-Oscillator
(3) RCA-6S7-G ..... I-F Amplifier
(4) RCA-6T7-G ..... 2nd-Det., A.V.C., and Audio
(5) RCA-6W7-G ..... Driver
(6) RCA-6L5-G ..... Output
(7) RCA-6L5-G ..... Output

Note: An RCA-5Y3-G rectifier is used in the CV-110 A-C power supply unit.

PILOT LAMPS (2).....Mazda No. 47, 6.3 volts, 0.15 amp.

POWER OUTPUT RATING

Maximum ..... 2.6 watts
Undistorted ..... 2.0 watts

LOUDSPEAKERS (Permanent-Magnet Dynamics)

7QB (RL-90-2) 8-inch
7QBK (RL-71-5) 12-inch
Voice-coil impedance at 400 cycles ..... 2.4 ohms

POWER SUPPLY RATING

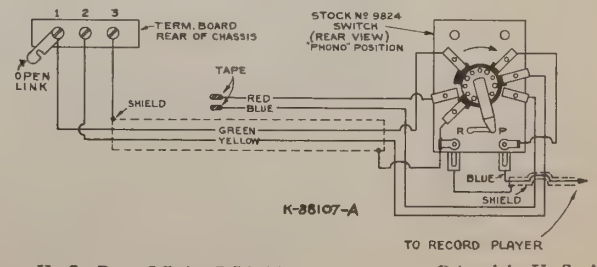
D-C Rating (with vibrator-type power supply unit MI-8122) —6.3 volts, 3.2 amps.

A-C Rating (with CV-110 A-C power supply unit)— 105-117, 117-130, 140-160, 200-225, 225-250 volts, 25-60 cycles.

Mechanical Specifications

Cabinet Dimensions (inches)	Height	Width	Depth
Model 7QB	10⅜	22 13/16	11¼
Model 7QBK	38	25½	12½
Chassis-Base Dimensions (inches)	2½	12	8
Over-All Chassis Height			7⅝ inches
Net Weight	29 lbs (7QB)		48¼ lbs. (7QBK)
Tuning Drive Ratio			10 to 1, and 50 to 1

Victrola Attachment (Record Player).—Terminals are provided on the rear of the chassis for convenient connection to a Victrola Attachment (record player) such as the RCA R93 and R94 series. A stock No. 9824 switch may be used to change from radio to record player. The connections of this switch are shown. In the event that a No. 9824 switch is not available, a double-pole double-throw toggle switch may be used.



First Edition

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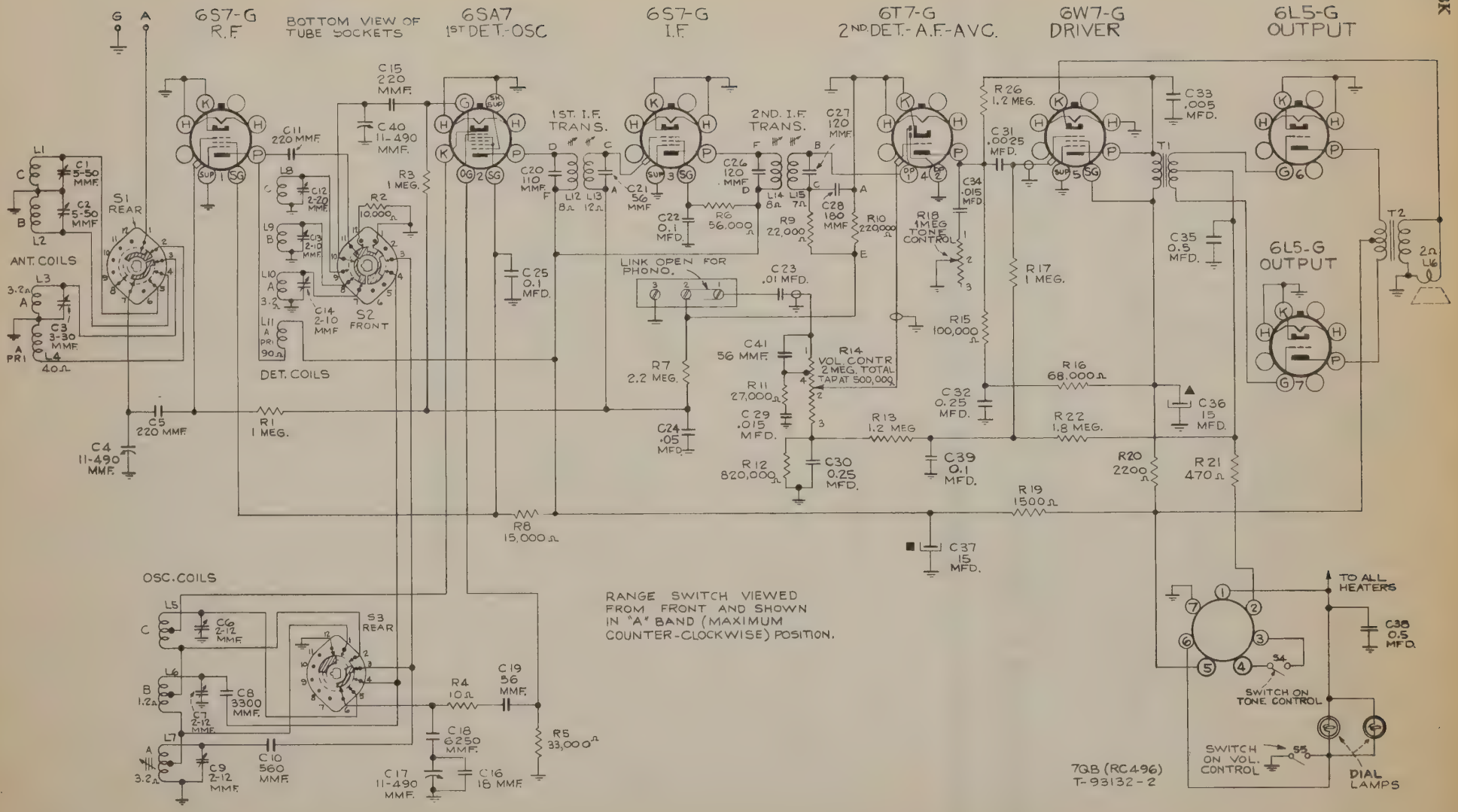
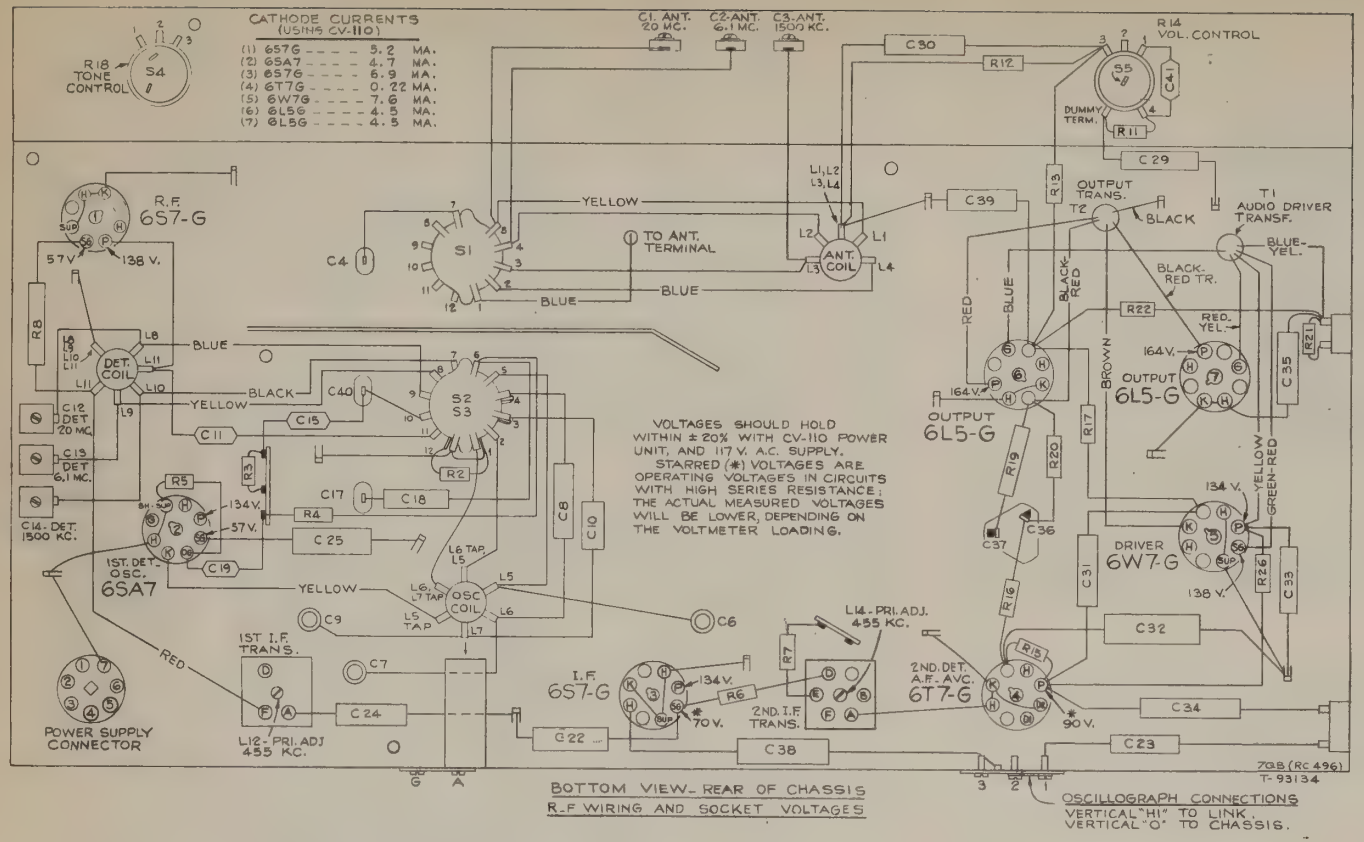
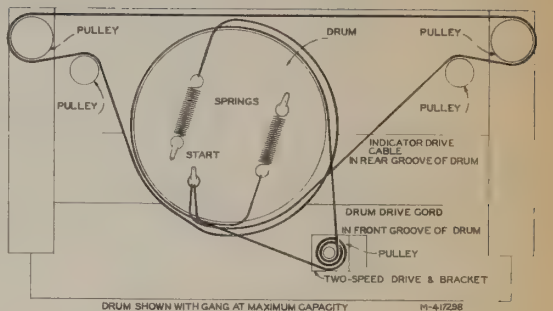
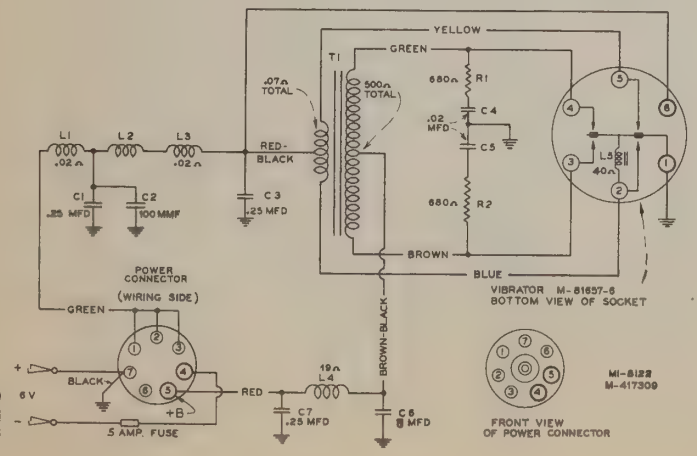
Printed in U. S. A.


6S7-G R.F.
BOTTOM VIEW OF TUBE SOCKETS
6SA7 1ST DET.-OSC
6S7-G I.F.
6T7-G 2ND DET.-A.F.-AVC.
6W7-G DRIVER
6L5-G OUTPUT
6L5-G OUTPUT
ANT. COILS
DET. COILS
OSC. COILS
1ST. I.F. TRANS.
2ND. I.F. TRANS.
LINK OPEN FOR PHONO.
RANGE SWITCH VIEWED FROM FRONT AND SHOWN IN "A" BAND (MAXIMUM COUNTER-CLOCKWISE) POSITION.
TO ALL HEATERS
SWITCH ON TONE CONTROL
SWITCH ON VOL. CONTROL
DIAL LAMPS
7QB (RC496) T-93132-2

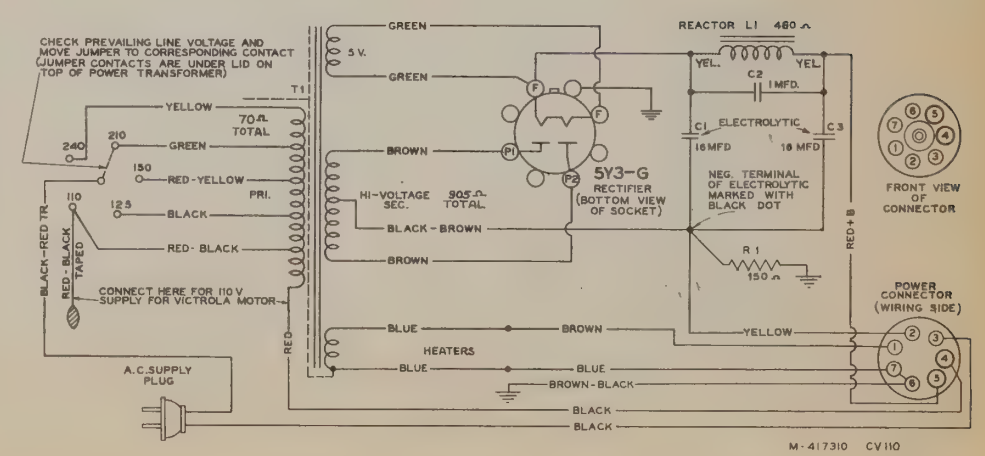

CATHODE CURRENTS
(USING CV-110)
(1) 6S7G - - - - 5.2 MA.
(2) 6SA7 - - - - 4.7 MA.
(3) 6S7G - - - - 6.9 MA.
(4) 6T7G - - - - 0.22 MA.
(5) 6W7G - - - - 7.6 MA.
(6) 6L5G - - - - 4.5 MA.
(7) 6L5G - - - - 4.5 MA.
R18 TONE CONTROL
S4
C1 ANT. 20 MC.
C2 ANT. 6.1 MC.
C3 ANT. 1500 KC.
R14 VOL. CONTROL
DUMMY TERM.
R.F. 6S7-G
57 V.
138 V.
TO ANT. TERMINAL
ANT. COIL
OUTPUT TRANS. T2
T1 AUDIO DRIVER TRANSF.
BLACK
BLUE-YEL.
BLACK-RED TR.
RED-YEL.
OUTPUT 6L5-G
164 V.
DET. COIL
C12 DET. 20 MC.
C13 DET. 6.1 MC.
C14 DET. 1500 KC.
1ST. DET. OSC. 6SA7
134 V.
57 V.
OSC COIL
L6 TAP
L7 TAP
1ST I.F. TRANS.
POWER SUPPLY CONNECTOR
L12 - PRI. ADJ. 455 KC.
I.F. 6S7-G
70 V.
2ND I.F. TRANS.
L14 - PRI. ADJ. 455 KC.
2ND. DET. A.F. AVC. 6T7-G
90 V.
DRIVER 6W7-G
VOLTAGES SHOULD HOLD WITHIN ± 20% WITH CV-110 POWER UNIT, AND 117 V. A.C. SUPPLY. STARRED (*) VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE; THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.
7Q8 (RC 496)
T-93134
BOTTOM VIEW - REAR OF CHASSIS
R.F. WIRING AND SOCKET VOLTAGES
OSCILLOGRAPH CONNECTIONS
VERTICAL "HI" TO LINK.
VERTICAL "O" TO CHASSIS.



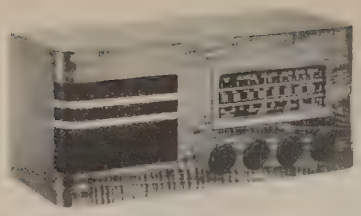
Above—Arrangement of Drive Cords for Tuning Condenser and Dial Indicator



MI-8122 Vibrator Type Power Supply Unit

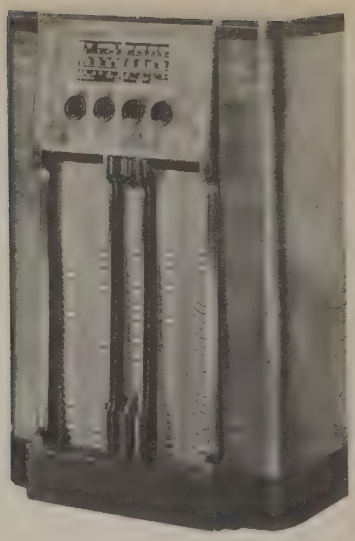


CV-110 A-C Power Supply Unit



At Left—
Model 7QB

At Right—
Model 7QBK



Precautionary Lead Dress.—

1. Dress the blue lead from the antenna lug to the No. 1 terminal on the range switch (S-1) close to the chassis and away from the gang for its entire length across the top of the chassis base.

2. Dress the yellow lead from the detector coil to No. 8 terminal on the range switch (S-2), directly away from the detector coil towards the rear apron.

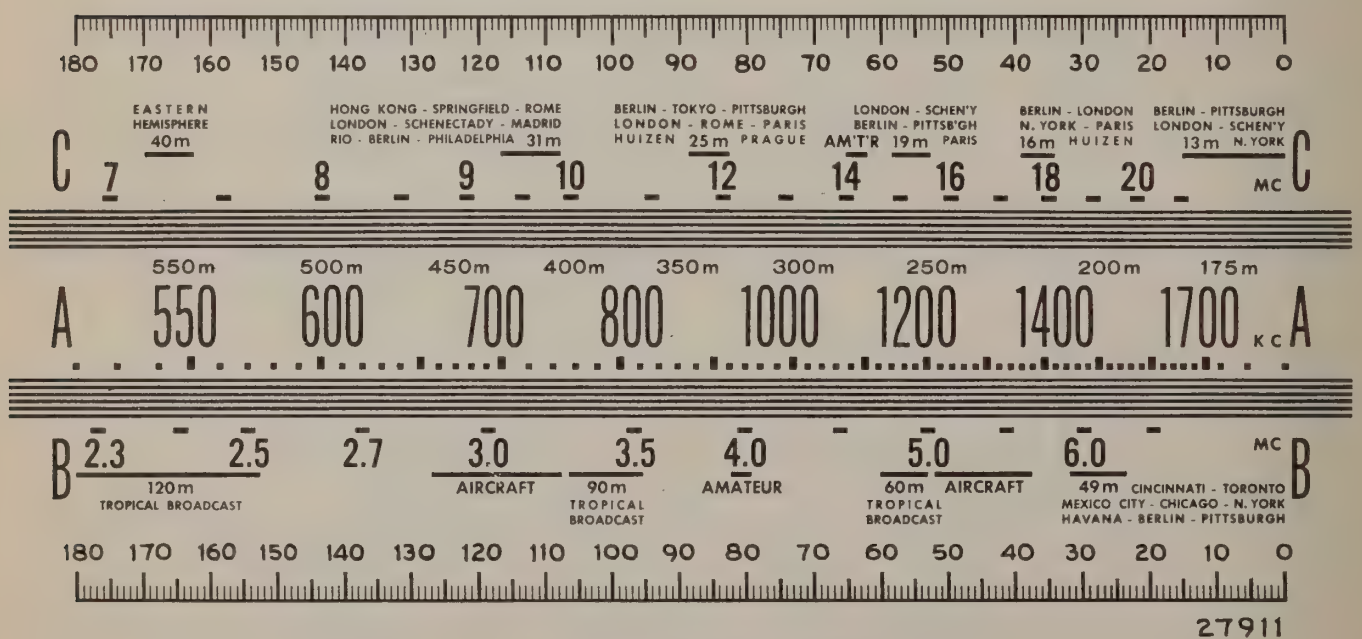
3. Keep the blue lead from the detector coil to No. 9 terminal on the range switch (S-2), isolated from the other leads and parts.

4. Loop the bus wire from oscillator coil to No. 5 terminal on the range switch (S-3), directly away from these terminals and other parts as far as possible, bending the loop towards the center of the chassis.

5. Dress the 3,300 mmfd. capacitor (C8) from the oscillator coil to No. 4 terminal on the range switch (S-3), directly toward the center of the chassis, being sure to clear the bus wire loop mentioned above (4).

6. Pull in the slack on the long yellow wire which runs from the terminal board in the rear corner to the tone control, at the tone control end, making the portion of the lead lying outside the front apron taut, and close to the apron.

Calibration Scale


180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
EASTERN HEMISPHERE 40m
HONG KONG - SPRINGFIELD - ROME
LONDON - SCHENECTADY - MADRID
RIO - BERLIN - PHILADELPHIA 31m
BERLIN - TOKYO - PITTSBURGH
LONDON - ROME - PARIS
HUIZEN 25m PRAGUE
LONDON - SCHEN'Y
BERLIN - PITTSB'GH
AM'T'R 19m PARIS
BERLIN - LONDON
N. YORK - PARIS
16m HUIZEN
BERLIN - PITTSBURGH
LONDON - SCHEN'Y
13m N. YORK
C 7 8 9 10 12 14 16 18 20 MC C
550m 500m 450m 400m 350m 300m 250m 200m 175m
A 550 600 700 800 1000 1200 1400 1700 KC A
B 2.3 2.5 2.7 3.0 3.5 4.0 5.0 6.0 MC B
120m TROPICAL BROADCAST
AIRCRAFT
90m TROPICAL BROADCAST
AMATEUR
60m TROPICAL BROADCAST
AIRCRAFT
49m CINCINNATI - TORONTO
MEXICO CITY - CHICAGO - N. YORK
HAVANA - BERLIN - PITTSBURGH
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
27911

Receiver Dial Scales, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 27.8° on the calibration scale corresponds to 1,500 kc on "A" band. Read instructions under "Alignment Procedure."

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver ground terminal (G), and keep the output as low as possible to avoid a-v-c action.

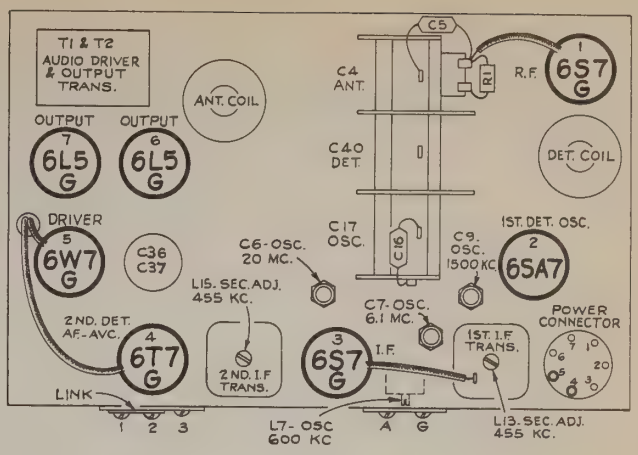
Calibration Scale on Indicator-Drive-Cord Drum. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

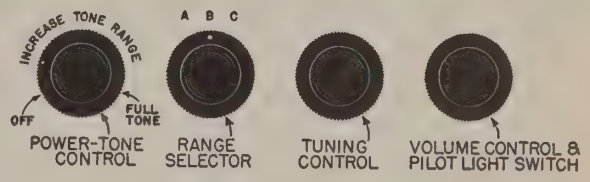
As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The surface of the drum must be flush with the end of the gang-condenser shaft. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the left-hand end mark on the dial scales and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

For additional details, refer to booklet "RCA Victor Receiver Alignment."





The pilot lights are illuminated by pressing in the volume-control knob. (The pilot lights are not controlled by this action when the receiver is operated with the CV-110 a-c power supply unit.)

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum peak output
1	6S7-G I-F grid cap in series with .01 mfd.	455 kc	"A" band Quiet point between 550-750 kc	L14 and L15 (2nd I-F trans.)
2	6SA7 1st det. grid cap in series with .01 mfd.			L12 and L13 (1st I-F trans.)
3	Antenna terminal in series with 300 ohms	20 mc	20 mc (22°) "C" band	C6 (osc.)* C12 (det.) (Rock C1 (ant.) Gang)
4		6.1 mc	6.1 mc (27.9°) "B" band	C7 (osc.)** C13 (det.) C2 (ant.)
5	Antenna terminal in series with 200 mmfd.	600 kc	600 kc (143.5°) "A" band	L7 (osc.) Rock Gang
6		1,500 kc	1,500 kc (27.8°) "A" band	C9 (osc.) C14 (det.) C3 (ant.)
7	Repeat steps 5 and 6			

* Use **minimum** capacity peak (plunger out) if two can be obtained. Check to determine that C6 has been adjusted to the correct peak by turning radio to approximately 19.09 mc where a weaker signal should be received.

** Use **minimum** capacity peak if two can be obtained. Check to determine that C7 has been adjusted to the correct peak by turning radio to approximately 5.19 mc where a weaker signal should be heard.

Note: Oscillator tracks **above** signal on all bands.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-496)
12806	Board—"Antenna-Ground" board
12717	Board—Phonograph terminal board
12714	Capacitor—Air-trimmer medium—2-12 mmfd. (C6, C7, C9)
34654	Capacitor—Mica trimmer comprising 2 sections of 2.5-10 mmfd., and 1 section of 2.5-20 mmfd. (C12, C13, C14)
34653	Capacitor—Mica trimmer comprising 2 sections of 5-50 mmfd., and 1 section of 3-30 mmfd. (C1, C2, C3)
12722	Capacitor—18 mmfd. (C16)
12723	Capacitor—56 mmfd. (C19, C41)
30949	Capacitor—56 mmfd. (C21)
32238	Capacitor—110 mmfd. (C20)
31813	Capacitor—120 mmfd. (C26, C27)
14712	Capacitor—180 mmfd. (C28)
12694	Capacitor—220 mmfd. (C5, C11, C15)
31433	Capacitor—560 mmfd. (C10)
31403	Capacitor—3,300 mmfd. (C8)
35252	Capacitor—6,250 mmfd. (C18)
34459	Capacitor—.0025 mfd. (C31)
33584	Capacitor—.005 mfd. (C33)
4937	Capacitor—.01 mfd. (C23)
30856	Capacitor—.015 mfd. (C29, C34)
32787	Capacitor—.05 mfd. (C24)
4839	Capacitor—0.1 mfd. (C22, C25, C39)
12484	Capacitor—0.25 mfd. (C30, C32)
12741	Capacitor—0.5 mfd. (C35, C38)
32152	Capacitor—Electrolytic, 2 sections 15 mfd. each (C36, C37)
31780	Coil—Antenna coil (L1, L2, L3, L4)—less shield
32824	Coil—Oscillator coil (L5, L6, L7)
31781	Coil—R.F coil (L8, L9, L10, L11)—less shield
31774	Condenser—3-gang variable tuning condenser
31777	Control—Tone control
31776	Control—Volume control and power switch
34662	Cord—Drive cord
32713	Core—Adjustable core and stud for oscillator coil
31787	Drive—Two (2) speed drive with mounting bracket
31808	Drum—Pointer cord drive drum
31480	Lamp—Dial lamp
31373	Pulley—Drive cord pulley - small
34854	Pulley—L.H. pulley and bracket assembly—less small pulley and retainer
34855	Pulley—R.H. pulley and bracket assembly—less small pulley and retainer
31788	Pulley—Two speed drive pulley
13988	Resistor—10 ohms, ½ watt (R4)
30546	Resistor—470 ohms, ½ watt (R21)
3153	Resistor—1,500 ohms, 1 watt (R19)
3526	Resistor—2,200 ohms, ½ watt (R20)
14559	Resistor—10,000 ohms, ½ watt (R2)
5114	Resistor—15,000 ohms, 1 watt (R8)
14284	Resistor—22,000 ohms, 1/10 watt (R9)
12738	Resistor—27,000 ohms, ½ watt (R11)
11300	Resistor—33,000 ohms, 1/10 watt (R5)
30650	Resistor—56,000 ohms, ½ watt (R6)
13715	Resistor—68,000 ohms, ½ watt (R16)
11281	Resistor—100,000 ohms, 1/10 watt (R15)
11398	Resistor—220,000 ohms, 1/10 watt (R10)
30963	Resistor—820,000 ohms, ½ watt (R12)
12013	Resistor—1 meg., 1/10 watt (R3, R17)
13730	Resistor—1 meg., ½ watt (R1)
31056	Resistor—1.2 meg., 1/10 watt (R13, R26)
35190	Resistor—1.8 meg., 1/10 watt (R22)
5131	Resistor—2.2 meg., 1/10 watt (R7)
30340	Retainer—Drive cord pulley—small retainer
4669	Screw—No. 8-32 square head set screw for drum Stock No. 31808
14374	Shield—Shield can for coils Stock Nos. 31780, 31781
31364	Socket—Dial lamp socket
31251	Socket—Tube socket
14404	Socket—7-prong male connector
13638	Spring—Drive cord spring
31775	Switch—Range switch
14261	Transformer—First i-f transformer
14283	Transformer—Second i-f transformer
32368	Transformer—Transformer pack including an audio and an output transformer (Replacement transformer has one additional green lead not required for 7QB or 7QBK—tape to prevent shorts)
	POWER SUPPLY UNIT ASSEMBLIES (MI-8122)
12720	Capacitor—100 mmfd.
31796	Capacitor—.02 mfd. (C3, C4)
12484	Capacitor—0.25 mfd. (C3)
33879	Capacitor—10 mfd.
14289	Clip—Battery clips—one marked "+" and one unmarked
31794	Coil—Choke coil
12819	Coil—Vibrator coil and terminal board assembly
5140	Fuse—5 Amp.
14409	Plug—7-contact female plug for power cable
12262	Resistor—680 ohms, ½ watt (R1, R2)
31793	Transformer—Vibrator power transformer
31795	Vibrator—Plug-in vibrator
	CV-110 A-C POWER SUPPLY UNIT
32015	Capacitor—1 mfd. (C2)
32013	Capacitor—Comprising 2 sections 16 mfd. each (C1, C3)
14409	Plug—7-contact plug for power output cable
32014	Reactor—Filter reactor (L1)
30880	Resistor—150 ohms, ½ watt (R1)
31251	Socket—Rectifier tube socket
31998	Transformer—Power transformer, 105-130, 140-160, 200-250 volts, 25-60 cycles (T1)
	SPEAKER ASSEMBLIES Model 7QB (RL-90-2)
31825	Cap—Dust cap
35193	Cone—Cone complete with voice coil
35192	Speaker—8-inch permanent magnet speaker complete with cone and voice coil—less plug
	SPEAKER ASSEMBLIES Model 7QBK (RL-71-5)
31275	Cone—Speaker cone and voice coil
5118	Plug—3-contact male plug for speaker
31798	Speaker Complete
	MISCELLANEOUS ASSEMBLIES
34859	Dial—Glass dial scale
33833	Escutcheon—Station selector dial scale escutcheon
34858	Frame—Dial frame complete—less pointer guide rods, pointer and carriage and dial scale
34860	Indicator—Station selector indicator
34862	Knob—Range switch knob
34861	Knob—Tuning, tone control or volume control and power switch knob
34491	Shaft—Pointer carriage guide rod
14270	Spring—Retaining spring for knobs Stock Nos. 34861 and 34862

RCA Victor

MODEL BT-40

Chassis No. RC-408

Four-Tube, Single-Band, Battery-Operated, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 8—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

Frequency Range ..... 540-1,720 kc
Intermediate Frequency ..... 455 kc

RCA Tube Complement

(1) RCA-1A7-G ..... 1st-Det.—Osc.
(2) RCA-1N5-G ..... I-F Amplifier
(3) RCA-1H5-G ..... 2nd-Det., A-F, and A.V.C.
(4) RCA-1C5-G ..... Output

Batteries Required

1 "A"—"B" Pack (Eveready No. 748 or equivalent).

Current Consumption

"A," 0.24 ampere—"B," 9.0 milliampere

Power Output

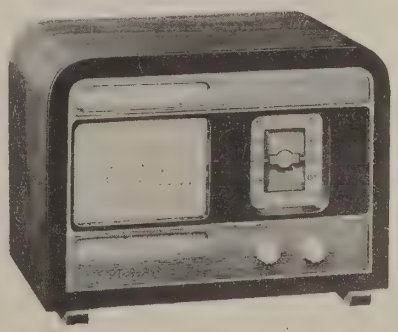
Undistorted ..... 0.10 watt
Maximum ..... 0.21 watt

Loudspeaker

Type ..... 4-inch permanent-magnet dynamic
Voice-coil Impedance ..... 2 ohms at 400 cycles

	Height	Width	Depth
Cabinet Dimensions (inches)	6½	9½	4-11/16
Chassis Base Dimensions (inches)	1½	8⅛	3⅜

Over-all Chassis Height ..... 5⅛ inches
Weight—Shipping weight ..... 6¼ pounds
Net weight ..... 4⅜ pounds
Tuning Drive Ratio ..... 11 to 1



The RCA Victor Model BT-40 is a table type battery operated radio receiver. It is designed for operation on a combination 1½-volt – 90-volt A-B Pack Battery.

CAUTION. — Before attempting to install or replace batteries or tubes or to make any repairs or changes, be sure to turn the left hand knob fully to the left (counter-clockwise), to turn off the power.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
11591	Button—Plug button for chassis		14076	Resistor—820 ohms, ½ watt	
13057	Capacitor—60 mmfd.		13715	Resistor—68,000 ohms, ½ watt	
12488	Capacitor—250 mmfd.		12264	Resistor—220,000 ohms, ½ watt	
12952	Capacitor—300 mmfd.		13730	Resistor—1 meg., ½ watt	
5107	Capacitor—.0025 mfd.		12679	Resistor—2.2 meg., ½ watt	
4937	Capacitor—.01 mfd.		13601	Resistor—10 meg., ½ watt	
32787	Capacitor—.05 mfd.		33061	Shaft—Tuning knob drive shaft	
4839	Capacitor—0.1 mfd.		32595	Shield—Tube shield—less cap	
32187	Capacitor—Electrolytic, 8 mfd.		32537	Socket—Tube socket	
32572	Coil—Antenna coil		33058	Speaker complete (39128-1)	
33055	Coil—Oscillator coil		30585	Spring—Drive cord tension spring	
33060	Condenser—2-gang tuning		32667	Spring—Retaining spring for knobs or drive drum	
32634	Cord—Drive cord		33056	Transformer—First i-f transformer	
33310	Dial—Glass dial scale		33057	Transformer—Second i-f transformer	
32946	Drum—Variable condenser drive drum		33062	Transformer—Output transformer	
32571	Knob—Tan volume or tuning knob		33059	Volume control and switch	
30550	Plug—4-prong male plug for battery cable				

First Edition

Printed in U. S. A.

Alignment Procedure

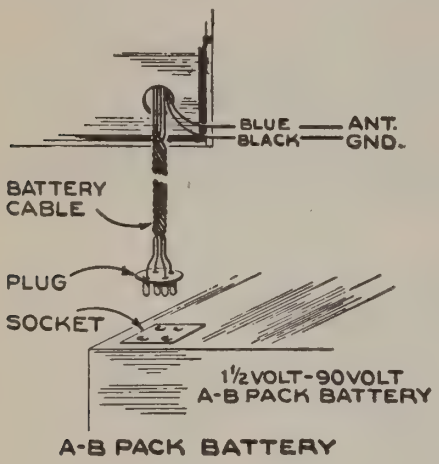
Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

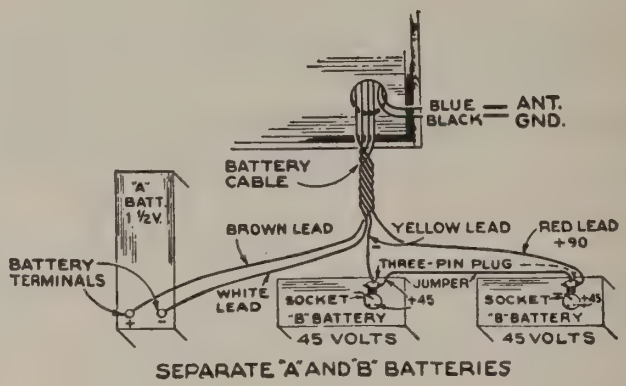
Test-oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

For additional details, refer to booklet "RCA Victor Receiver Alignment."

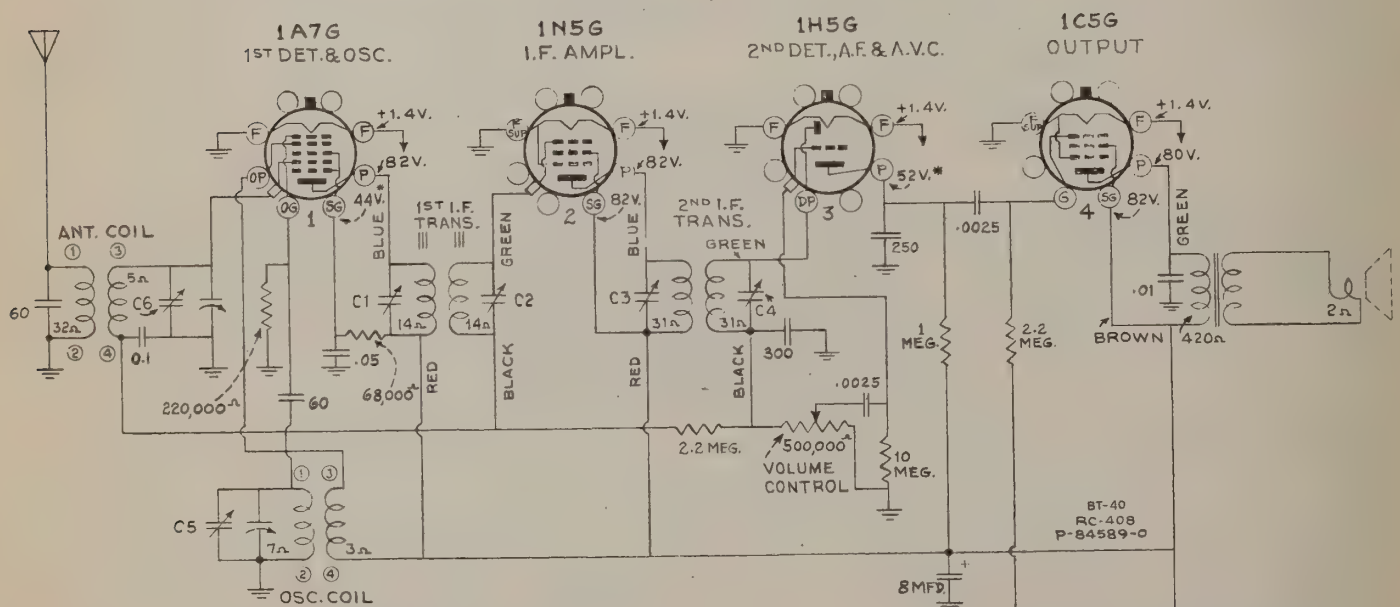
Pre-setting Dial.—With gang condenser in full mesh, the pointer should be horizontal.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	1A7G 1st-Det. grid cap, in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna lead (blue) in series with 100 mmfd.	1,720 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C6 (antenna)





Installation of Batteries



Schematic Circuit Diagram

RCA Victor MODELS BK-41 and BT-41

Chassis No. RC-449 RC-449

Four-Tube, Single-Band, Battery-Operated Superheterodyne Receivers

and

RCA Victor Model CV-40 (RS-98) A-C Power Unit

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 45—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,720 kc
Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT
(1) RCA-1A7-G ..... 1st. Detector-Oscillator
(2) RCA-1N5-G ..... I-F Amplifier
(3) RCA-1H5-G ..... Second Detector A.V.C., and A-F
(4) RCA-1Q5GT ..... Power Output

CV-40
Rectifier RCA-5U4-G
Plug-in Resistor ..... WW48, Stock No. 34563

POWER OUTPUT (Battery Operation)
Undistorted ..... 0.125 watt
Maximum ..... 0.300 watt

LOUDSPEAKER
Type ..... Permanent Magnet Dynamic
Diameter ..... BK41, 8 inches; BT41, 5 inches
Voice Coil Impedance BK41, 2.2 ohms; BT41, 3.0 ohms at 400 cycles

BATTERY REQUIRED
Combination 1½ volt-90 volt A-B Pack

CURRENT CONSUMPTION
"A" at 1.4 volts, 0.25 amp.
"B" at 90 volts, 9.4 ma.

A-C Operation

Use of power unit CV-40 with either Model BK41 or BT41 adapts that receiver for A-C operation.

	Height	Width	Depth
Cabinet Dimensions, BK41	30 in.	25½ in.	12¼ in.
Cabinet Dimensions, BT41	13 3/16 in.	17⅝ in.	7⅝ in.
Chassis Base Dimensions	2 in.	9¾ in.	5½ in.
Over-All Chassis Height			6⅜ in.
Weight, BK41			48 lbs. (shipping)
Weight, BT41			15 lbs. (shipping)
Tuning Drive Ratio			8 to 1

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES BT41 (RC-449)—BK41 (RC-449A)
12629	Capacitor—56 mmfd (C6)
12723	Capacitor—56 mmfd. (C13)
14262	Capacitor—110 mmfd. (C5)
12404	Capacitor—120 mmfd. (C7, C8)
12725	Capacitor—150 mmfd. (C11)
14712	Capacitor—180 mmfd. (C9)
32599	Capacitor—430 mmfd. (C17)
5148	Capacitor—.007 mfd. (C12)
14393	Capacitor—.01 mfd. (C4, C10, C19)
4839	Capacitor—0.1 mfd. (C1, C20)
32187	Capacitor—8 mfd., 150 volts (C18)
32150	Coil—Antenna coil assembly (L1, L2)
32148	Coil—Oscillator coil assembly (L3, L4)
34375	Condenser—2 gang variable tuning with drum (C2, C3, C14, C15, C16)
32634	Cord—Drive cord
34377	Dial—Dial scale only
34378	Indicator—Dial pointer
34256	Lamp—Blinker lamp
34376	Plate—Dial scale mounting plate and bracket, complete with scale
34498	Plug—4-prong male for battery cable
12262	Resistor—680 ohms, ½ watt (R9)
14284	Resistor—22,000 ohms, 1/10 watt (R3)
13715	Resistor—68,000 ohms, ½ watt (R1)
12264	Resistor—220,000 ohms, ½ watt (R10)
13730	Resistor—1 megohm, ½ watt (R4, R6)
12679	Resistor—2.2 megohm, ½ watt (R2, R7, R8)
13167	Resistor—3.9 megohm, ½ watt (R11)
14887	Retainer—Retaining ring for tuning shaft
30952	Shaft—Tuning knob shaft (Model BT41)
32597	Shaft—Tuning knob shaft (Model BK41)
4233	Shield—Tube shield
30956	Socket—Speaker socket
31251	Socket—Tube socket
14191	Spring—Drive cord tension spring
14261	Transformer—First i-f transformer
14308	Transformer—Second i-f transformer
30947	Volume control and switch (Model BT41)
34557	Volume control and switch (Model BK41)
	SPEAKER ASSEMBLIES (MODEL BT41) (84226-3)
32163	Cone—Speaker cone and voice coil (L9)
5133	Pin—Contact pin for speaker leads
32164	Transformer—Output transformer (T1)
	SPEAKER ASSEMBLIES (MODEL BK41) (84760-1)
34385	Cone—Speaker cone, voice coil, and metal housing
5133	Pin—Contact pin for speaker leads
34386	Transformer—Output transformer
	MISCELLANEOUS ASSEMBLIES
34380	Escutcheon—Dial escutcheon and crystal
30863	Knob—Tuning or volume control knob (Model BT41)
33434	Knob—Tuning or volume control knob (Model BK41)
30900	Spring—Retaining spring for knobs (Model BT 41)
14270	Spring—Retaining spring for knobs (Model BK 41)
	MODEL CV 40
34563	Ballast—Ballast resistor tube WW48 (R1, R2)
32826	Capacitor—Electrolytic, 2 sections 40 mfd. and 1 section 20 mfd. (2 used) (C1, C2, C3, C4, C5)
34564	Cover—Power switch cover
34560	Reactor—Filter reactor (L1)
34563	Resistor—Ballast resistor tube WW48 (R1, R2)
14499	Resistor—1,500 ohms, ½ watt (R4)
34562	Socket—4-contact female for power output
31319	Socket—Rectifier or ballast tube socket
34561	Switch—S.P.S.T. power switch (S1)
34559	Transformer—Power transformer 105-125 and 200-250 volts, 50-60 cycle (T1)
34563	Tube—Ballast resistor tube WW48 (R1, R2)

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Printed in U. S. A.

Alignment Procedure

Cathode-ray Alignment is the preferable method. Connections for the oscillograph are as follows: Vertical "Hi" to E on the 2nd I-F transformer, Vertical "O" to chassis.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

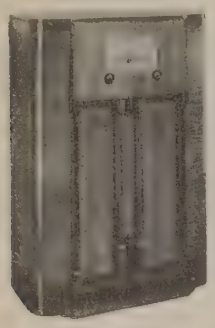
Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

For additional details, refer to booklet "RCA Victor Receiver Alignment."

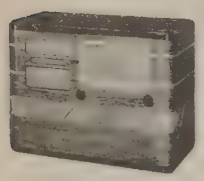
Pre-setting Dial.—With gang condenser in full mesh, the pointer should be horizontal.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
No. 1	1N5-G I-F grid cap, in series with 0.01 mfd.	455 kc	Quiet point between 550-750 kc	L7 and L8 (2nd I-F transformer)
No. 2	1A7-G 1st-det. grid cap in series with 0.01 mfd.	455 kc		L5 and L6 (1st I-F transformer)
No. 3	Antenna lead, in series with 200 mmfd.	600 kc	600 kc	L4 (oscillator) L2 (antenna)
No. 4	Antenna lead, in series with 200 mmfd.	1,500 kc	1,500 kc	C15† (oscillator) C3 (antenna)

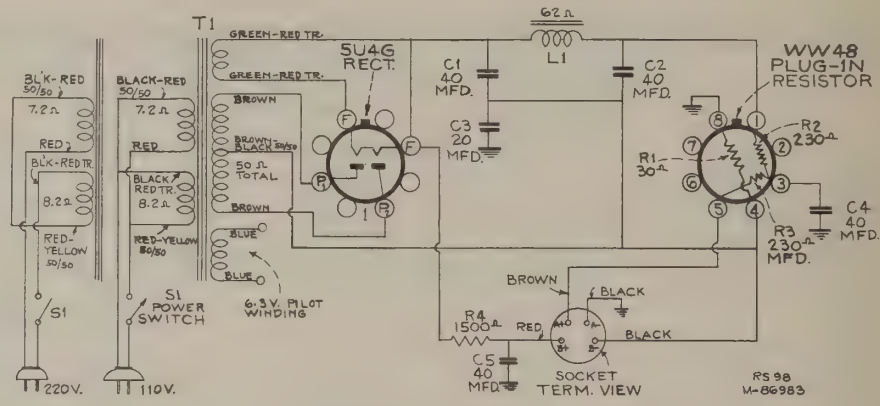
† Trimmer C16 on gang condenser should be unscrewed one complete turn from tight, before adjusting C15.



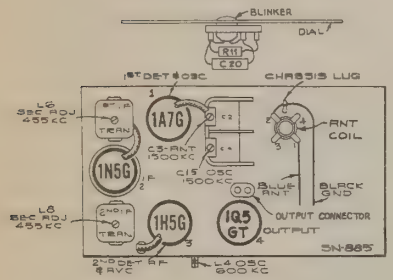
Model BK-41



Model BT-41

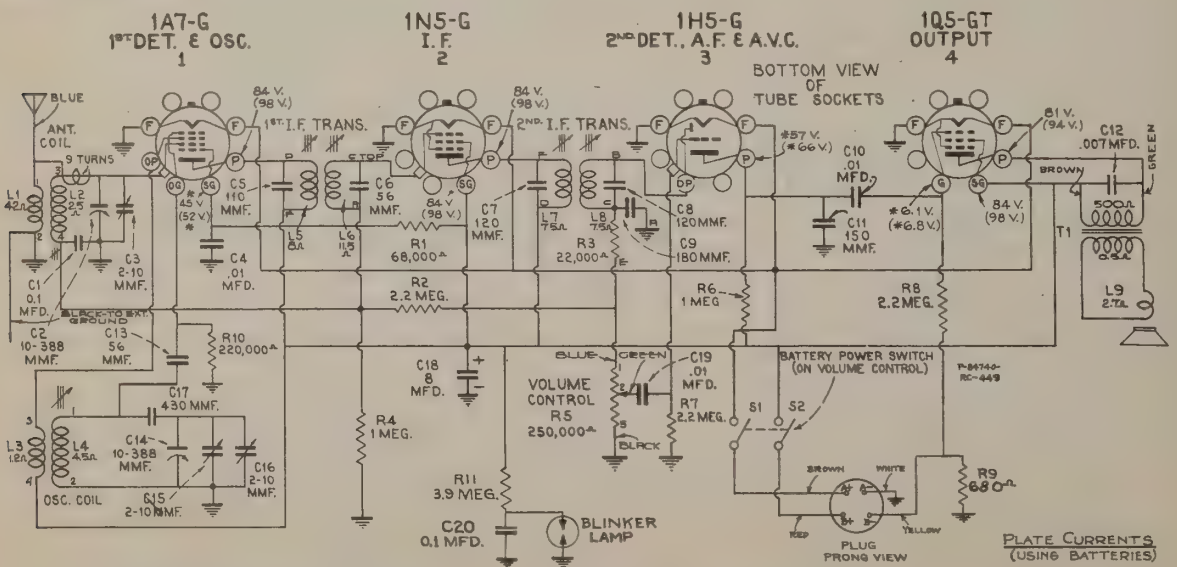


Schematic Diagram—Model CV-40



Precautionary Lead Dress

1. Red lead from second i-f transformer to screen terminal of 1N5-G must be dressed close to and along edge of chassis.
2. Twisted green wire from antenna coil to gang must be 9 turns and kept clear of rotor.
3. Blue and green leads to volume control must be dressed close to chassis and between gang and front apron.
4. The opening in the shield of the 1N5-G should be turned away from the chassis and the i-f transformers.
5. Antenna and ground wires shoud be twisted together.



STARRED (*) VOLTAGES ARE OPERATING VOLTAGES IN CIRCUITS WITH HIGH SERIES RESISTANCE; THE ACTUAL MEASURED VOLTAGES WILL BE LOWER, DEPENDING ON THE VOLTMETER LOADING.

VOLTAGES IN PARENTHESES ARE THOSE OBTAINED BY USING POWER SUPPLY CV-40. WHEN BATTERIES ARE USED VOLTAGES NOT IN PARENTHESES APPLY.

PLATE CURRENTS (USING BATTERIES)

1A7G	
OSC.	0.85 MA.
DET.	0.49 MA.
1N5G	1.2 MA.
1H5G	.026 MA.
1Q5GT	6.0 MA.

RCA Victor

MODEL BT-42

Chassis No. RC-408A

Four-Tube, Single-Band, Battery-Operated, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 32 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

Frequency Range ..... 540-1,720 kc
Intermediate Frequency ..... 455 kc

RCA Tube Complement

(1) RCA-1A7-G ..... 1st-Det.—Osc.
(2) RCA-1N5-G ..... I-F Amplifier
(3) RCA-1H5-G ..... 2nd-Det., A-F, and A.V.C.
(4) RCA-1Q5-G ..... Output

Batteries Required

1 "A"—"B" Pack (Eveready No. 748 or equivalent).

Current Consumption

"A," 0.24 ampere—"B," 10 milliamperes.

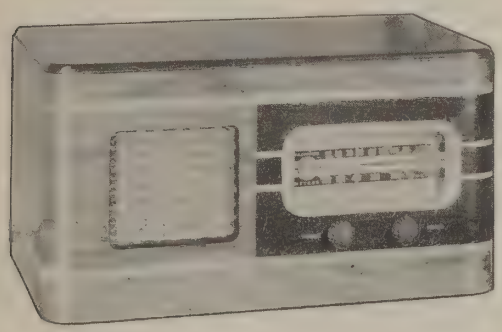
Power Output

Undistorted ..... 0.15 watt
Maximum ..... 0.25 watt

Loudspeaker

Type .....5-inch permanent-magnet dynamic
Voice-coil Impedance ..... 3.3 ohms at 400 cycles

Cabinet Dimensions (inches)..... Height 9¾, Width 17½, Depth 9¾
Weight—Shipping weight..... 16 pounds
Tuning Drive Ratio..... 16 to 1



General Description

The RCA Victor Model BT-42 is a table type battery operated radio receiver.

Features of design include: On and off "Economy" Blinker; 4 RCA 1.4 volt low drain tubes; large horizontal dial; magnetite core transformers; automatic volume control; 16 to 1 tuning ratio; 5" permanent magnet speaker, and an available converter unit (CV40) to convert the receiver to 110 volt AC operation.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLY		34123	Indicator—Dial scale pointer	
			34256	Lamp—Blinker lamp	
13057	Capacitor—60 mmfd (C6, C13)		34122	Plate—Metal support plate and bushing for dial	
12720	Capacitor—100 mmfd (C12)		30550	Plug—4 contact male plug for battery cable	
30433	Capacitor—400 mmfd (C16)		3708	Resistor—620 ohms, ½ watt (R9)	
33584	Capacitor—.005 mfd (C14, C17)		12412	Resistor—47,000 ohms, ½ watt (R4)	
32787	Capacitor—.05 mfd (C7)		13715	Resistor—68,000 ohms, ½ watt (R2)	
4839	Capacitor—0.1 mfd (C1, C19, C20)		12264	Resistor—220,000 ohms, ½ watt (R1)	
33952	Capacitor—8 mfd (C18)		13730	Resistor—1 megohm ½ watt (R7)	
34126	Clip—Dial lamp clip		12679	Resistor—2.2 megohm ½ watt (R8)	
32150	Coil—Antenna coil		13167	Resistor—3.9 megohm ½ watt (R10, R11)	
32573	Coil—Oscillator coil		13601	Resistor—10 megohm ½ watt (R3, R6)	
34121	Condenser—2 gang variable tuning		34124	Shaft—Tuning knob shaft	
32634	Cord—Indicator drive cord		32595	Shield—Tube shield	
34125	Dial—Dial scale		32537	Socket—Tube socket	
33453	Drum—Indicator drive cord drum		31615	Spring—Drive cord tension spring	

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
33296	Spring—Retaining spring for drum		33459	Transformer—Output transformer	
34118	Transformer—First I-F transformer			MISCELLANEOUS ASSEMBLY	
34119	Transformer—Second I-F transformer		34127	Escutcheon—Dial escutcheon	
34120	Volume Control and switch		31659	Knob—Tuning or volume control knob	
	SPEAKER ASSEMBLY 84650-1		33312	Nut—Speed nut for tuning condenser support plate	
33458	Cone—Speaker cone and voice coil		31646	Spring—Retaining spring for knob	

Alignment Procedure

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action.

Pre-setting Dial.—With the gang condenser fully out of mesh, the indicator should point to the extreme right (high frequency) mark on the dial scale.

CAUTION.—When ready to install or replace batteries or tubes or to make any repairs or changes, be sure to turn off power switch.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn Radio Dial to—	Adjust the following for max. peak output—
1	1A7G 1st-Det. grid cap, in series with .01 mfd.	455 kc	Quiet point at 550 kc End of Dial	C8, C9, C10, C11 (1st and 2nd I-F transformers)
2	Antenna lead (blue) in series with 100 mmfd.	1,500 kc	1,500 kc	C5 (oscillator)
3		600 kc	600 kc	L1 (antenna)*
4		1,500 kc	1,500 kc	C3 (antenna)

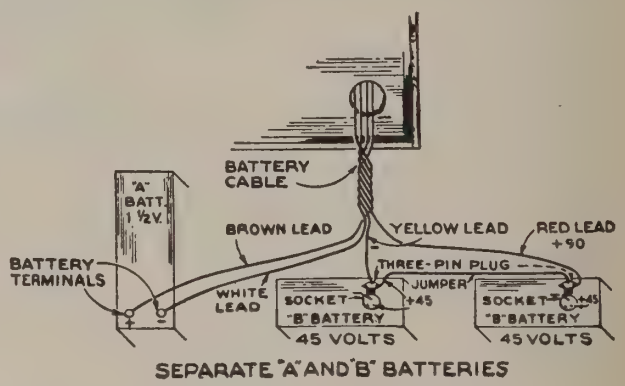
* When adjusting L1 (antenna), trimmer C3 should be in a minimum capacity position (unscrewed).

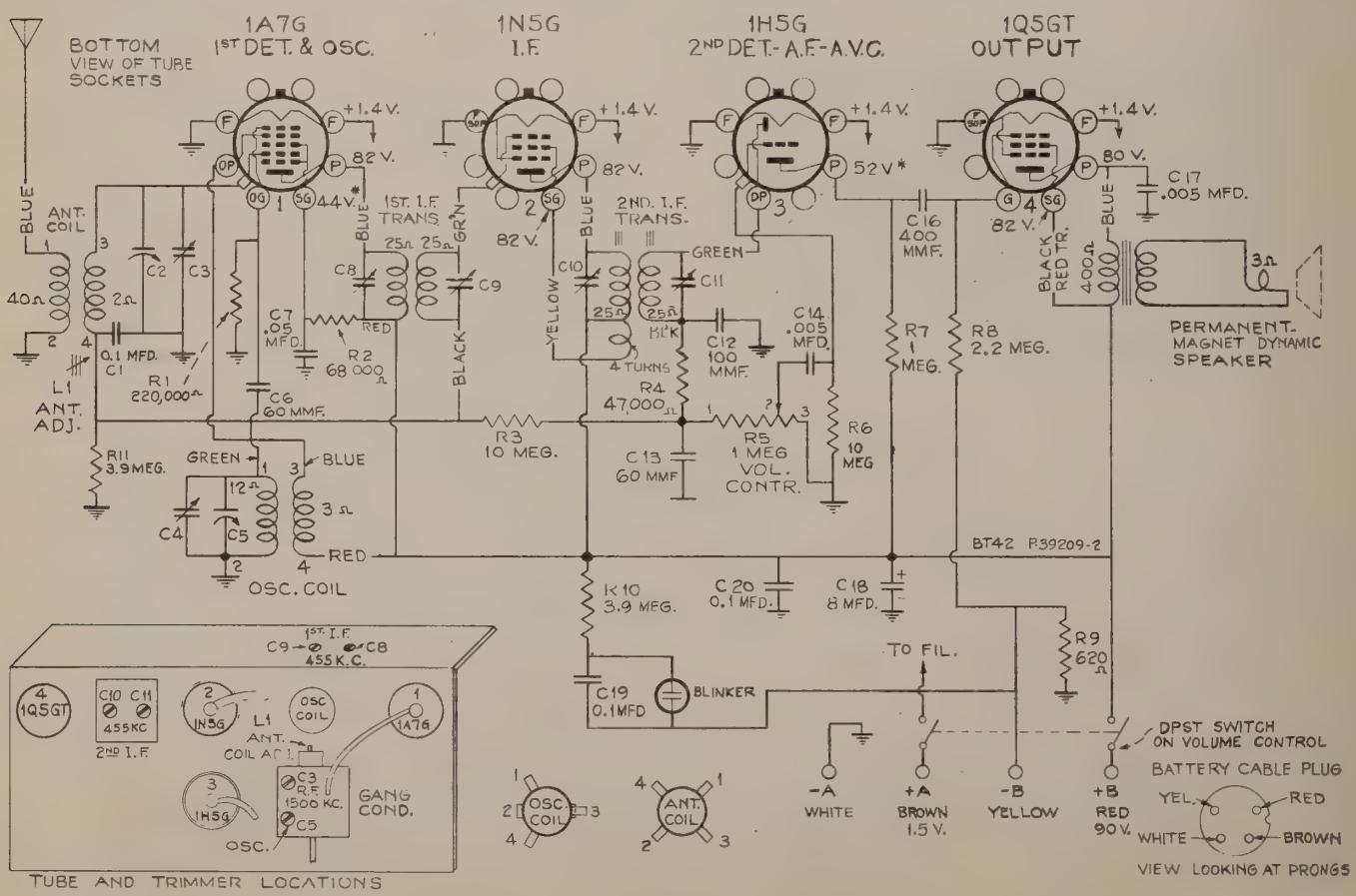
Precautionary Lead Dress.—

1. All filament (brown) and B+ (red) leads must be dressed away from unshielded I.F. coil.

2. Green grid lead of 1A7G tube to be twisted around antenna (blue) lead for capacity coupling.

3. Red and brown battery cable leads to be dressed and held against front apron with tape.





RCA Victor

MODELS BP-55, BP-56, and BP-85

Chassis No. RC-455

Five-Tube, Single-Band, Battery or House Current Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 40 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

Frequency Range ..... 540-1,600 kc
Intermediate Frequency ..... 455 kc

RCA Tube Complement

(1) RCA-1A7-GT ..... 1st.-Det.—Osc.
(2) RCA-1N5-GT ..... I-F Amplifier
(3) RCA-1H5-GT ..... 2nd-Det., A-F, and A.V.C.
(4) RCA-1T5-GT ..... Output
(5) RCA-117Z6-G or 35Z5-GT ..... Rectifier

Line Current Supply

110 to 125 volts, AC 50 or 60 cycles, or DC

Batteries Required

"A" one 6 volt dry plug-in type (Eveready No. 747 or equivalent)
"B" two 45 volt dry plug-in type (Eveready No. 482 or equivalent)

Current Consumption

"A," 0.05 ampere—"B," 10.5 milliamperes full power;
6.0 milliamperes save power.

Power Output

Undistorted ..... 0.125 watt
Maximum ..... 0.17 watt

Loudspeaker

Type ..... 5-inch permanent-magnet dynamic
Voice-coil Impedance ..... 4.5 ohms at 400 cycles

	Height	Width	Depth
Cabinet Dimensions (inches)	10¾	13	5

Weight—(Net) less batteries ..... 8½ pounds
With batteries ..... 15½ pounds
Tuning Drive Ratio ..... 6 to 1

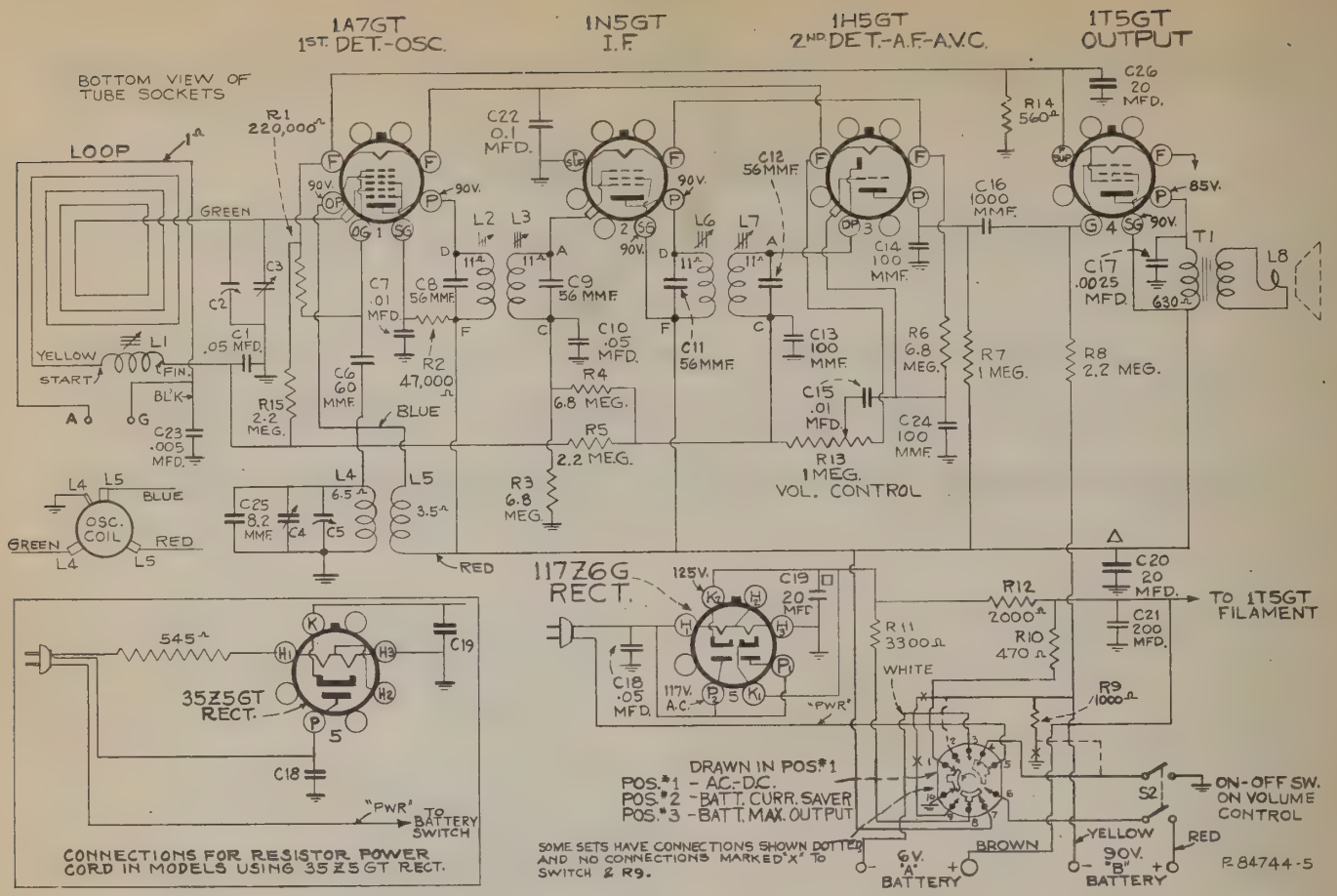
The following models comprise the BP-55 series. All contain the RC-455 chassis.

BP-55 Light Cloth
BP-56 Dark Cloth
BP-85 Leatherette

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-455)		34473	Resistor—2,000 ohms, 10 watts (R12)	
13001	Capacitor—8.2 mmfd. (C25)		12312	Resistor—3,300 ohms, ½ watt (R11)	
30949	Capacitor—56 mmfd. (C8, C9, C11, C12)		12412	Resistor—47,000 ohms, ½ watt (R2)	
13057	Capacitor—60 mmfd. (C6)		12264	Resistor—220,000 ohms ½ watt (R1)	
12720	Capacitor—100 mmfd. (C13, C14, C24)		13730	Resistor—1 meg., ½ watt (R7)	
12635	Capacitor—1,000 mmfd. (C16)		12679	Resistor—2.2 meg., ½ watt (R5, R8, R15)	
34459	Capacitor—.0025 mfd. (C17)		14661	Resistor—6.8 meg., ½ watt (R3, R4, R6)	
33584	Capacitor—.005 mfd. (C23)		31319	Socket—Tube socket	
4937	Capacitor—.01 mfd. (C7, C15)		34467	Switch—Power selector switch (S1)	
32787	Capacitor—.05 mfd. (C1, C10, C18)		34466	Transformer—First i-f transformer (L2, L3, C8, C9)	
4839	Capacitor—0.1 mfd. (C22)		34466	Transformer—Second i-f transformer (L6, L7, C11, C12)	
34472	Capacitor—Electrolytic comprising 2 sections of 20 mfd. each, and 1 of 200 mfd. (C19, C20, C21)			**SPEAKER ASSEMBLIES (RL-85-1)**	
34965	Capacitor—Electrolytic 20 mfd. (C26)		32907	Cap—Cone center dust cap	
34468	Coil—Loop loading coil (L1)		34554	Cone—Speaker cone, voice coil, and center suspension (L8)	
34877	Coil—Oscillator coil (L4, L5)		34555	Transformer—Output transformer (T1)	
34464	Condenser—Variable tuning condenser (C2, C3, C4, C5)			**MISCELLANEOUS ASSEMBLIES**	
34465	Control—Volume control and power switch (R13, S2)		34476	Dial—Dial scale and mounting plate	
34469	Indicator—"On-Off" indicator		34611	Handle—Carrying handle for Model BP-55 and BP-85	
34471	Indicator—Station selector indicator		34612	Handle—Carrying handle for Model BP-56	
5133	Pin—Pin on loop leads		34015	Knob—Tuning, volume control or voltage switch knob	
34470	Plate—Power selector switch indicator plate		31193	Lead—Antenna lead—approximately 25 ft. long	
34689	Plug—2-contact male plug for battery cable		34556	Loop—Complete loop and support	
32641	Plug—3-contact male plug for battery cable				
12414	Resistor—560 ohms, ½ watt (R14)				
30499	Resistor—470 ohms, ½ watt (R10)				
14720	Resistor—1,000 ohms, ½ watt (R9)				



Schematic Circuit Diagram

Measurements are made to chassis unless otherwise indicated, with set tuned to quiet point. Values should hold within approximately ± 20% with rated battery voltage.

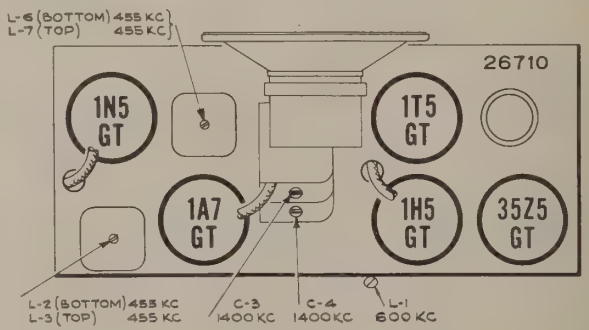
Alignment Procedure

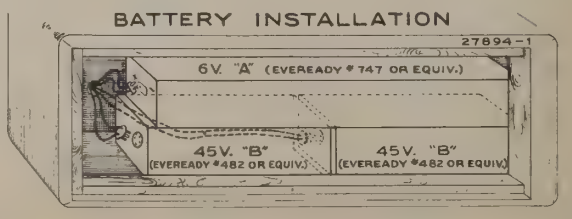
Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	1A7GT 1st-Det. grid cap, in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	L2, L3, L6, L7 (1st and 2nd I-F transformers)
2		1,600 kc	1,600 kc	C4 osc.
3	radiated signal near 600 kc		signal frequency	L1
4	radiated signal near 1,400 kc		signal frequency	C3
5	radiated signal near 600 kc		signal frequency	L1

For steps 3, 4, and 5 the chassis must be in the cabinet and the batteries in place and connected. L-1 is then reached through the small hole in the cabinet which is normally covered with a small plug located farthest away from C-3 and C-3 is reached through an eyelet in the speaker grille. If a broadcast signal is used it should be weak to avoid a-v-c action. Turning loop to minimum pickup position will sometimes be helpful. If no broadcast signal is available connect test oscillator output to a suitable radiation loop located several feet away from receiver.





RCA Victor

MODEL 94BP1 SERIES PORTABLE

Chassis No. RC-407

Four-Tube, Single-Band, Battery-Operated, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 9—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

Frequency Range ..... 550-1,720 kc
Intermediate Frequency ..... 455 kc

RCA Tube Complement

(1) RCA-1A7-G ..... 1st-Det.—Osc.
(2) RCA-1N5-G ..... I-F Amplifier
(3) RCA-1H5-G ..... 2nd-Det., A-F, and A.V.C.
(4) RCA-1C5-G ..... Output

Batteries Required

"A," one 1.5 volt dry plug-type "A," 2¾-in. x 2¾-in. x 4-in. (Eveready No. 742 or equivalent)
"B," two 45 volt dry plug-type "B," 2¾-in. x 4-in. x 5¼-in. (Eveready No. 762 or equivalent)

Current Consumption

"A," 0.24 ampere—"B," 9.0 milliamperes

Power Output

Undistorted ..... 0.10 watt
Maximum ..... 0.21 watt

Loudspeaker

Type ..... 4-inch permanent-magnet dynamic
Voice-coil Impedance ..... 2 ohms at 400 cycles

	Height	Width	Depth
Cabinet Dimensions (inches)	9⅛	12¼	6⅛

Weight—(Net) less batteries ..... 6 pounds
With batteries ..... 12½ pounds

Tuning Drive Ratio ..... 10 to 1

The following models comprise the 94BP1 Series—all contain the No. RC-407 chassis.

94BP61 Dark Brown
94BP62 Tan
94BP64 Light Brown
94BP66 Gray
94BP80 Brown Leather
94BP81 Black Leather

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-407)		14076	Resistor—820 ohms, ½ watt	
13057	Capacitor—60 mmfd.		13715	Resistor—68,000 ohms, ½ watt	
12488	Capacitor—250 mmfd.		12264	Resistor—220,000 ohms, ½ watt	
12952	Capacitor—300 mmfd.		13730	Resistor—1 meg., ½ watt	
5107	Capacitor—.0025 mfd.		12679	Resistor—2.2 meg., ½ watt	
4838	Capacitor—.005 mfd.		13601	Resistor—10 meg., ½ watt	
32787	Capacitor—.05 mfd.		33305	Shaft—Tuning knob shaft and bushing	
4839	Capacitor—0.1 mfd.		32595	Shield—Tube shield—less cap	
33303	Capacitor—Electrolytic, 8 mfd.		32537	Socket—Tube socket	
33055	Coil—Oscillator coil		30585	Spring—Drive cord spring	
33060	Condenser—2-gang variable tuning		33296	Spring—Drive drum retaining spring	
32634	Cord—Drive cord		33301	Transformer—First i-f transformer	
32946	Drum—Drive cord drum		33302	Transformer—Second i-f transformer	
33300	Loop—Complete antenna loop			SPEAKER ASSEMBLIES (39128-1)	
32208	Plug—2-contact plug for battery cable		33058	Speaker complete	
32641	Plug—3-contact male plug for battery cable		33062	Transformer—Output transformer	

Replacement Parts (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	MISCELLANEOUS ASSEMBLIES				
33310	Dial—Glass dial scale				
33311	Escutcheon—Dial scale escutcheon				
33006	Feet—Cabinet feet				
33376	Handle—Carrying handle—Models 94BP61 94BP62, 94BP64		32895	Knob—Walnut tuning knob—Models 94BP62, 94BP81	
33377	Handle—Carrying handle—Model 94BP66		33307	Knob—Walnut volume control knob—Models 94BP62, 94BP81	
33306	Knob—Black tuning knob—Model 94BP66		33312	Nut—Speed nut to mount dial	
33308	Knob—Black volume control knob—Model 94BP66		31646	Spring—Knob retaining spring	

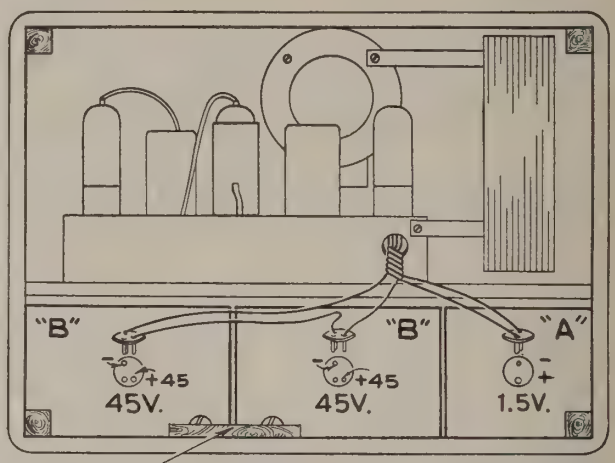
Alignment Procedure

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action.

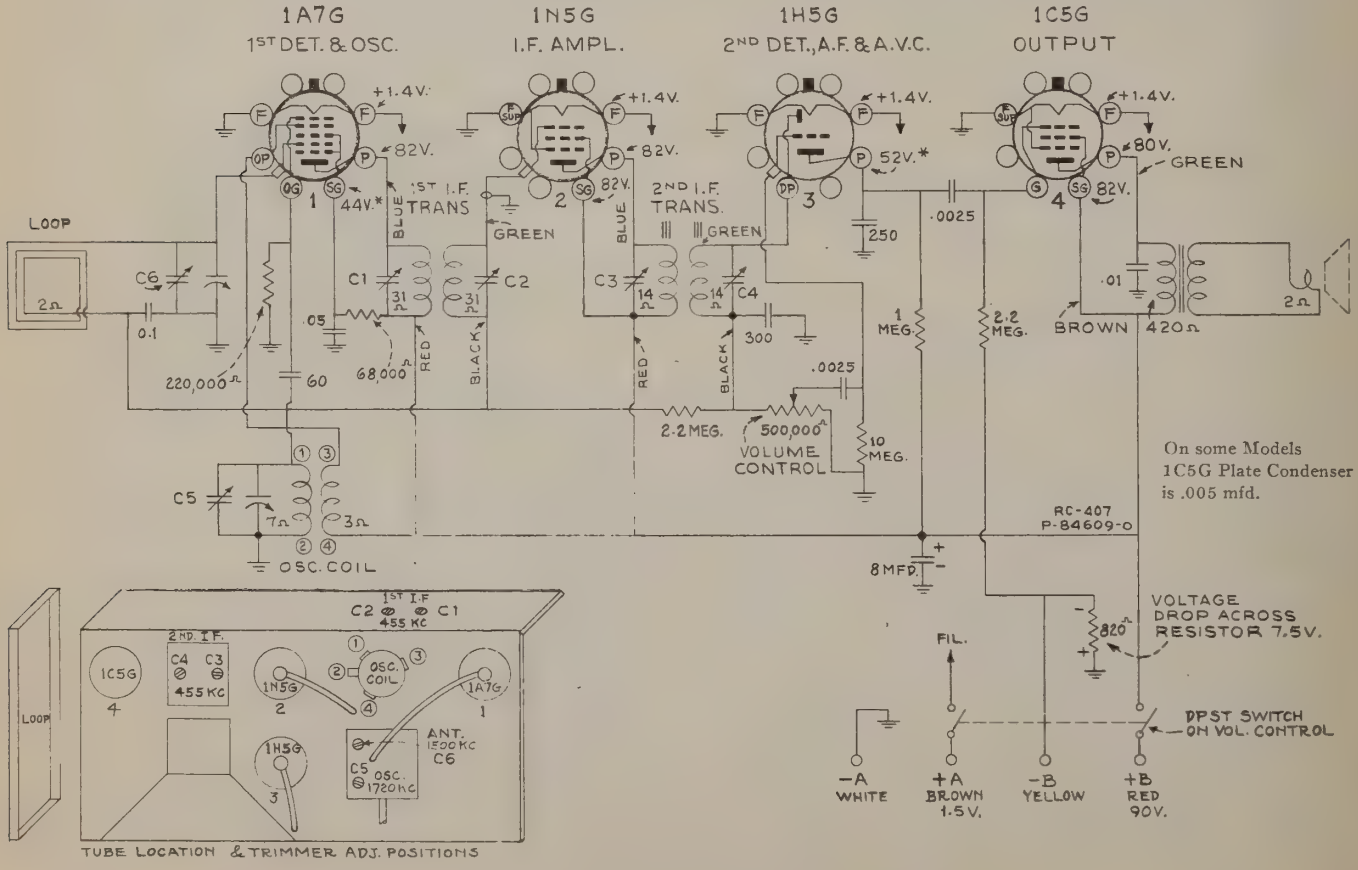
Pre-setting Dial.—With gang condenser in full mesh, the pointer should be horizontal.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	1A7G 1st-Det. grid cap, in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C1, C2, C3, C4 (1st and 2nd I-F transformers)
2	Antenna coil loop by means of one turn of wire placed near loop	1,720 kc	Full clockwise (out of mesh)	C5 (oscillator)
3		1,500 kc	Resonance on 1,500 kc signal	C6 (antenna)



REMOVE THIS BLOCK-PLACE BATTERIES IN CABINET AS INDICATED

REAR VIEW OF CABINET SHOWING BATTERIES



Schematic Circuit Diagram

Note: Values with star (*) are operating voltages. Values not starred are actual measured voltages.

Measurements are made to chassis unless otherwise indicated, with set tuned to quiet point. Values should hold within approximately ± 20% with rated battery voltage.

RCA Victor

MODEL 94BP-1 SERIES, 2nd Production

Chassis No. RC-407B

Four-Tube, Single-Band, Battery-Operated, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U.S.A.
A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

Frequency Range ..... 530-1,650 kc
Intermediate Frequency ..... 455 kc

RCA Tube Complement

(1) RCA-1A7-G ..... 1st-Det.—Osc.
(2) RCA-1N5-G ..... I-F Amplifier
(3) RCA-1H5-G ..... 2nd-Det., A-F, and A.V.C.
(4) RCA-1Q5-GT ..... Output

Batteries Required

"A," one 1.5 volt dry plug-type "A," 2¼-in. x 2¼-in. x 4-in. (Eveready No. 742 or equivalent)
"B," two 45 volt dry plug-type, "B," 2½-in. x 4-in. x 5¼-in. (Eveready No. 762 or equivalent)

Current Consumption

"A," 0.24 ampere—"B," 11.6 milliamperes

Power Output

Undistorted ..... 0.12 watt
Maximum ..... 0.25 watt

Loudspeaker

Type ..... 4-inch permanent-magnet dynamic
Voice-coil Impedance ..... 2 ohms at 400 cycles

	Height	Width	Depth
Cabinet Dimensions (inches)	9⅛	12¼	6¼
Weight—(Net) less batteries			6 pounds
With batteries			12½ pounds

Tuning Drive Ratio ..... 10 to 1

The following models comprise the 2nd Production 94BP1 Series—all contain the No. RC-407B chassis.

94BP61 Dark Brown
94BP62 Tan
94BP64 Light Brown
94BP66 Gray

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	CHASSIS ASSEMBLIES (RC-407-B)		33296	Spring—Drive drum retaining spring	
			34118	Transformer—1st I.F. transformer	
34121	Capacitor—2-gang variable tuning		34119	Transformer—2nd I.F. transformer	
13057	Capacitor—60 mmfd.				
12720	Capacitor—100 mmfd.			SPEAKER ASSEMBLIES (39128-1)	
30433	Capacitor—400 mmfd.				
33584	Capacitor—.005 mfd.				
32787	Capacitor—.05 mfd.		35601	Cone and voice coil	
4839	Capacitor—0.1 mfd.		33058	Speaker—Complete	
33303	Capacitor—Electrolytic—8 mfd.		33062	Transformer—Output transformer	
34592	Coil—Antenna loop adjusting coil				
32573	Coil—Oscillator coil			MISCELLANEOUS ASSEMBLIES	
34590	Control—Volume control and power switch				
32634	Cord—Drive cord		33310	Dial—Glass dial scale	
32946	Drum—Drive cord drum		34426	Disc—"On-Off" indicator disc (with flat of shaft hole opposite white segment in disc)	
34591	Loop—Antenna loop less adjusting coil				
32208	Plug—2-contact plug for battery cable		34774	Disc—"On-Off" indicator disc (with flat of shaft hole 90° counter-clockwise from white segment in disc)	
32641	Plug—3-contact plug for battery cable				
12414	Resistor—560 ohms, ½ watt				
12412	Resistor—47,000 ohms, ½ watt		33376	Handle — Carrying handle — Models 94BP-61, -62, -64	
13715	Resistor—68,000 ohms, ½ watt				
14020	Resistor—150,000 ohms, ½ watt		33377	Handle—Carrying handle—Model 94BP-66	
13730	Resistor—1 megohm, ½ watt		33306	Knob—Black tuning or volume control and power switch knob for Model 94BP-66	
12679	Resistor—2.2 megohm, ½ watt				
13167	Resistor—3.9 megohm, ½ watt		32571	Knob—Tan tuning or volume control and power switch knob for Models 94BP-61, -64	
13601	Resistor—10 megohm, ½ watt				
33305	Shaft—Tuning knob shaft and bushing		32895	Knob—Walnut tuning or volume control and power switch knob for Model 94BP-62	
32595	Shield—Tube shield less cap				
31319	Socket—Tube socket		33312	Nut—Speed nut to mount dial	
30585	Spring—Drive cord spring		31646	Spring—Knob retaining spring	

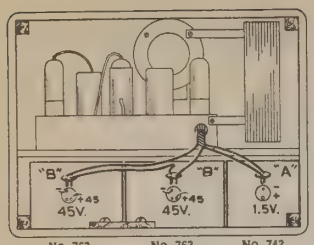


Figure 1.

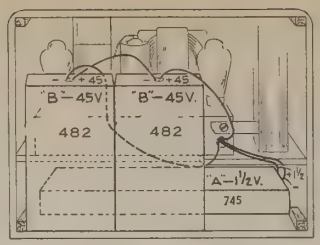


Figure 2.

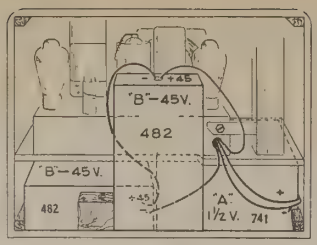


Figure 3.

For your convenience a wide variety of battery complements may be used with this receiver, and Figures 1, 2, and 3 illustrate three different sets of batteries installed in place. The following table gives type numbers of Eveready batteries but any equivalent battery of standard make may be used.

Figure	"A" battery 1½ v.	"B" battery 45 v. ea.
1	No. 742	No. 762
2	No. 745	No. 482 or No. 727
3	No. 741, No. 742 or No. 743	No. 482 or No. 727

Alignment Procedure

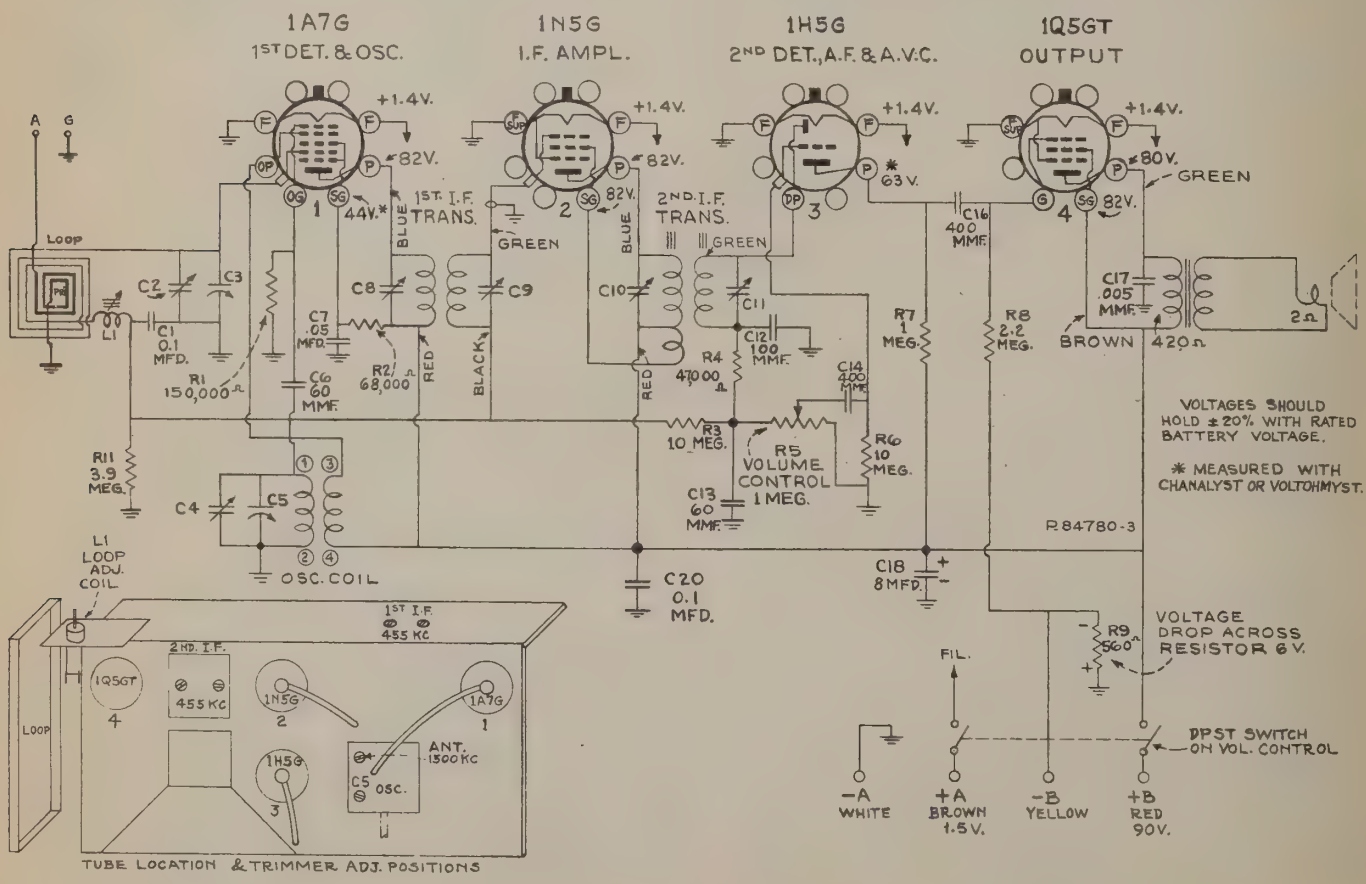
Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action. Connect low-side of oscillator to the receiver chassis.

Pre-setting Dial.—With gang condenser in full mesh, the pointer should be horizontal.

Loop-Adjusting Coil.—The second production of 94BP-1 series incorporates a loop inductance adjustment coil (L1) which is adjusted at 600 kc. For best performance, it is recommended that the alignment procedure be followed exactly as given. This will ensure maximum sensitivity over the entire broadcast band.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	1A7G 1st-Det. grid cap, in series with .01 mfd.	455 kc	Quiet point at 1,600 kc end of dial	C11, C10, C9, C8 (1st and 2nd I-F transformers)
2	Antenna terminal, in series with 15 mmfd.	1,650 kc	Full clockwise (out of mesh)	C4 (oscillator)
3		Set antenna trimmer C2 approximately ½ turn from maximum capacity		
4		600 kc	600 kc signal	L1 (ant.)
5		1,500 kc	1,500 kc	C2 (ant.)
6	Repeat steps 4 and 5			



First Edition

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Printed in U. S. A.

RCA Victor

MODEL M50

Chassis No. RC 357J

Five-Tube, Push-Button, Superheterodyne Automobile Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 22 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

TUBES AND FUNCTIONS

(1) RCA-6A8 ..... First Detector—Oscillator
(2) RCA-6K7 ..... I-F Amplifier
(3) RCA-6Q7 ..... Second Det., A-F Amp. and A.V.C.
(4) RCA-6K6GT ..... Output
(5) RCA-OZ4G ..... Rectifier
Dial Lamp ..... 6-8 volts, 0.2 amp., Mazda 51

FREQUENCY RANGE ..... 550-1,550 kc

POWER OUTPUT

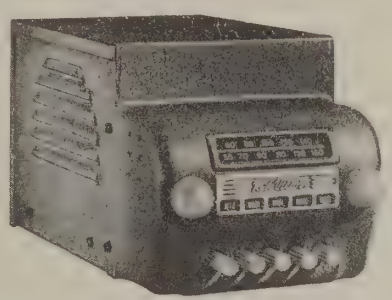
Type ..... Pentode
Undistorted ..... 2 watts
Maximum ..... 3.5 watts

ALIGNMENT FREQUENCIES

I-F ..... 455 kc
Ant. ..... 600 and 1,400 kc
Oscl. ..... No Adjustment

POWER SUPPLY

"A" .... 6.3 volt Auto Storage Battery
"B" ..... Non-Synchronous Vibrator
Current Drain ..... 6.0 amps.



LOUDSPEAKER

Type ..... Electrodynamic
Size ..... 5 inches
V.C. Impedance ..... 3.2 ohms at 400 cycles
Field Coil Resistance ..... 5 ohms

CHASSIS FEATURES

No. I-F Stages ..... One
Completely Shielded Ant. Filter
Magnetite-core Adjusted Antenna and I-F Transformers
Ignition-Noise-Suppression Filters
Antenna Compensator Trimmer
Illuminated Dial

OPERATING FEATURES

Mechanical Push Button Tuning
Independent Manual Tuning Control
Automatic Volume Control

Mechanical Specifications

OPERATING CONTROLS

1. Left Knob ..... On-Off Switch and Volume
2. Push Buttons ..... Station Tuning
3. Right Knob ..... Manual Tuning, Ratio 2½—1

Net Weight ..... 8½ pounds
Shipping Weight ..... 14 pounds

CONTROL OPERATION

Turn Right ..... Power On; Volume Increase
Push Button ..... Signal Tuned Automatically
Rotate ..... Signal Tuned Manually

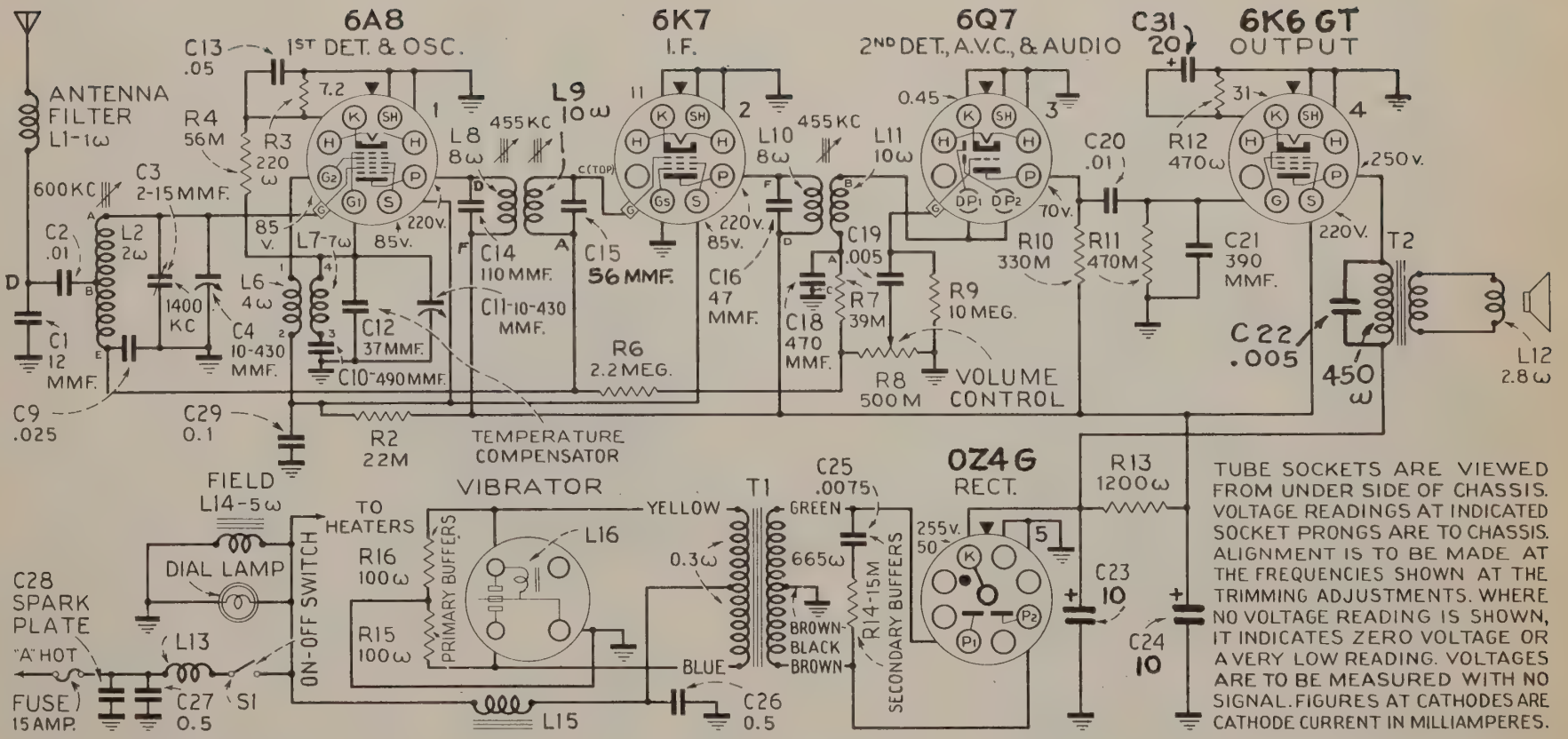
CASE DIMENSIONS

Height ..... 6-in. Width ..... 6-in. Depth ..... 10¾-in.

General Description

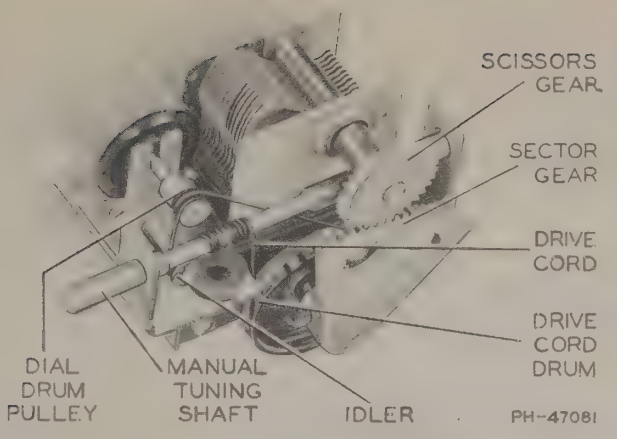
Model M50 is a five-tube superheterodyne receiver with loudspeaker and radio chassis in the same case. It is equipped with five push buttons, for tuning your five favorite broadcast stations, as well as the standard method of dial tuning. Adjustments for push button tuning are explained under the heading "Push Button Tuning Mechanism." The receiver is designed to be mounted under the dash panel. The operating controls are integral with the radio and speaker case.

Loudspeaker.—The loudspeaker voice coil should be centered in the usual manner with three narrow paper feelers, after first removing the front dust cover. The dust cover should be cemented back in place with ambroid cement after adjustment has been completed.



M = 1000 OHMS

Schematic Circuit Diagram



Tuning Mechanism

Antenna Circuit

The antenna circuit is designed to work with a low capacity antenna having a total capacity including the shielded lead-in not to exceed 150 mmf. If larger antennas, such as screened top or a double under the running-board having a total capacity of 200 to 550 mmf. is to be used, it will be necessary to reduce the value of the antenna coupling capacitor C-2 from .01 to approximately 200 mmf. (.0002). For even larger antennas such as insulated steel tops, a correspondingly smaller value of C-2 (approximately 125 to 150 mmf.) should be used keeping in mind to use the largest value possible with which the antenna circuit can be aligned.

After installation, and with antenna connected, tune in a weak station near 1,400 kc and adjust compensator trimmer (C-3) for maximum signal output. This trimmer is accessible by prying off the nameplate between the control knobs.

Antenna Filter

A filter is included in the antenna circuit. Being completely shielded, it prevents radiating ignition interference within the set, It also reduces the possibility of picking up vibrator interference. The filter unit is mounted inside a steel shell which in turn is welded to the chassis. The shielded antenna lead-in makes contact with the filter unit within the steel shell and is held in place by a bayonet type connector.

Push Button Tuning Mechanism

The push button tuning mechanism used in this receiver is of the mechanical type, wherein the movement of the button actually turns the tuning condenser to any pre-determined setting. The movement is actuated thru a Push-Arm, Cam, Rocker Plate and Sector Gear, which meshes with a Scissors Gear directly fastened to the tuning condenser shaft. The scissors gear prevents backlash between the sector gear and the tuning condenser. Since the sector gear is mounted directly on the rocker plate shaft, the position of the rocker plate will accurately determine the position of the tuning condenser.

Setting Up Stations

The push buttons should be adjusted for five favorite stations after the receiver is installed and operating.

Any standard broadcast stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push buttons one-half turn.
2. Using the tuning control, accurately tune in the first station.
3. With station accurately tuned in, press the first push button fully in and then gently release so as not to jar mechanism.
4. Tighten the push button securely with fingers. Do not force with pliers.
5. Proceed in same manner to adjust the other four push buttons.

Adjustments

The mechanism should be adjusted so that when using either manual or push-button tuning, it operates positively and without backlash or bind. The following hints will be found helpful in adjusting the mechanism properly.

1. With the gang condenser in full mesh, the sector gear should have the two end teeth fully meshed in the scissor gear.
2. The position of the sector gear on the rocker-plate shaft should be adjusted so that there is clearance between the rocker-plates and the frame of the push-button mechanism at both extremities of gang rotation. Thus correct adjustment prevents the rotation of the gang being limited by the rocker plates touching the frame.
3. The drive cord should have 8½ turns around the tuning shaft as shown in the illustration. Three degrees of adjustment of the tension on the drive cord may be obtained by use of the three positions for connecting the drive-cord-tension spring to the drive-cord drum on the condenser shaft as shown.
4. The push-arms, rocker-plate shaft, and pulleys should be lubricated with light grease (sparingly). Care should be taken to keep the lubricant off the drive cord.

Manual Tuning

A manual tuning knob is provided so that additional stations may be tuned in as desired. The manual tuning shaft is connected thru a cord drive to a drum on the rocker plate shaft. This same cord drives the dial drum by passing over a pulley on the drum shaft. A sketch shows the complete cord drive assembly and the correct number of turns which the cord should be wrapped around the drive shaft and dial drum pulley. Stops are provided on the dial drum so that dial scale adjustment is made by tuning the set to the extreme ends of the band.

Alignment Procedure

PRELIMINARY:

Output meter connections ..... Across speaker voice coil
Output meter readings to indicate 1 watt ..... 1.8 volts
Generator ground lead connections ..... To chassis
Dummy antenna value to be in series with generator output ..... See Chart Below
Connection of generator output lead ..... See Chart Below
Generator modulation ..... 30%, 400 cycles
Position of Volume Control ..... Fully clockwise
Chassis must be in its case with front end removed, when aligning R-F circuit.

Position of Dial Pointer	Generator Frequency	Dummy Antenna	Generator Connection	Adjustment Symbol	Circuit Adjusted
No Signal 550-750 kc	455 kc	.001 mfd.	6K7 Grid	L-10	2nd I.F. Trans.
No Signal 550-750 kc	455 kc	.001 mfd.	6A8 Grid	L-8, L-9	1st I.F. Trans.
1,400 kc	1,400 kc	.0001 mfd. †	Ant. Lead	C-3	Ant.
600 kc	600 kc	.0001 mfd. †	Ant. Lead	L-2	Ant.
1,400 kc	1,400 kc	.0001 mfd. †	Ant. Lead	C-3 *	Ant.

NOTE: No oscillator alignment adjustments are required in this receiver.

IMPORTANT ALIGNMENT NOTES.

† Make the generator connection to the receiver thru a shielded lead-in having not more than 50 mmf. (.00005) capacity with a male connector attached for connection to antenna socket. If C-2 has been changed, as outlined under "Antenna Circuit," for reason of a high capacity antenna, the Dummy Antenna should be the same value as the antenna itself.

* Re-adjust C-3 after installation as outlined under "Antenna Circuit"

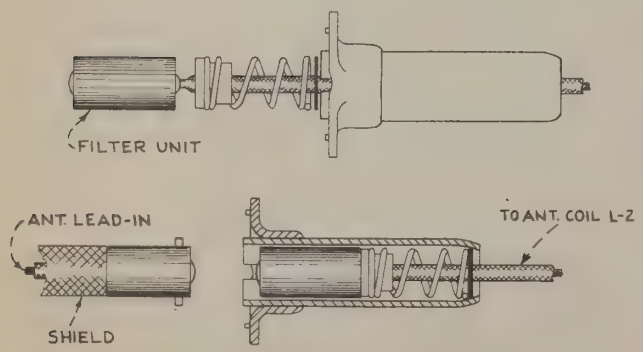
Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value, to prevent the A.V.C. action of the receiver from interfering with accurate alignment.

Alignment adjustment locations are shown on the top and bottom parts location views of chassis.

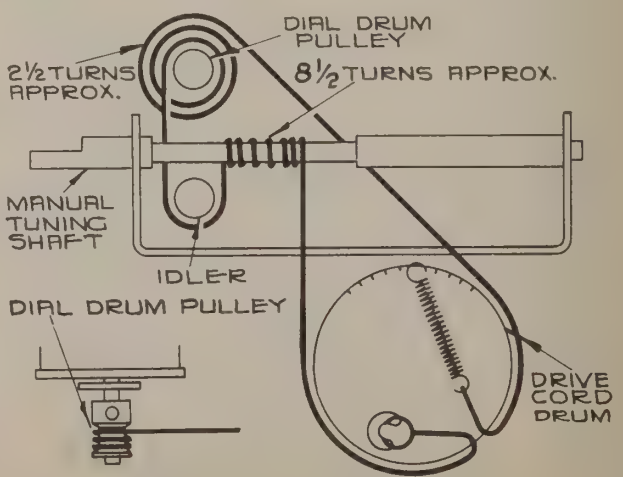
Only the dummy antenna indicated in the chart for any particular frequency should be used. Grid cap leads should remain in place during alignment.

Oscillator circuit alignment is not required in this receiver at either end of the band; the oscillator coil is preadjusted for inductance in the factory.

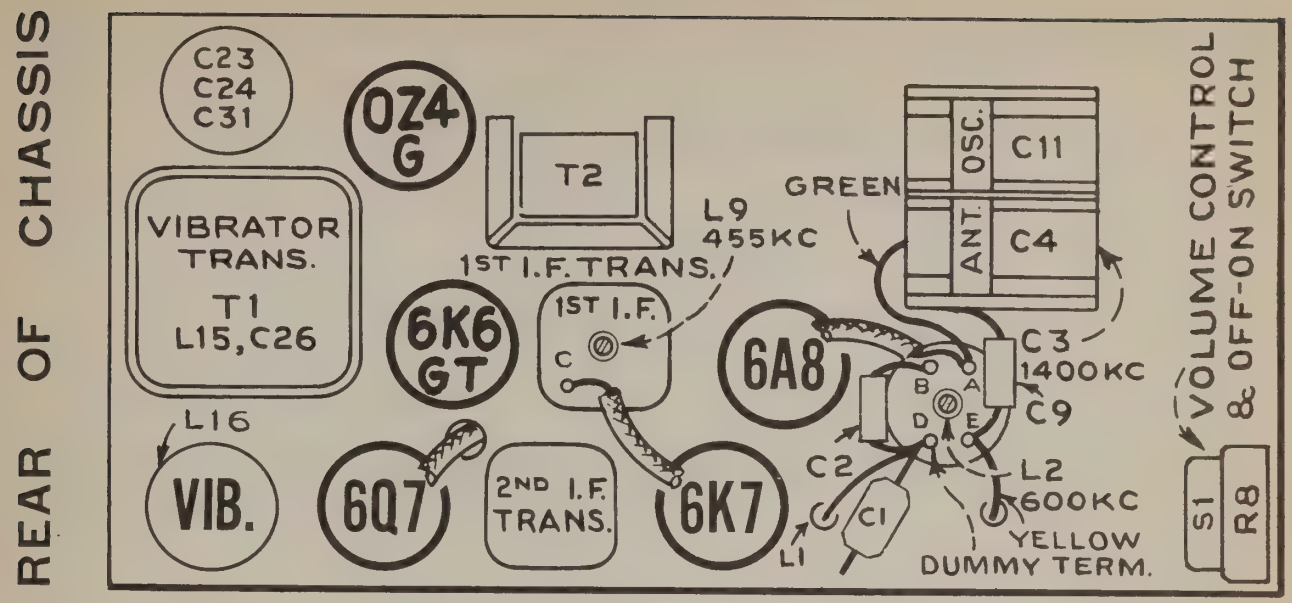
Since the oscillator coil is unshielded, the case has some effect on its inductance. Therefore alignment must be done either with the chassis in the case or with a steel plate (covering the bottom of chassis), substituting for the case.



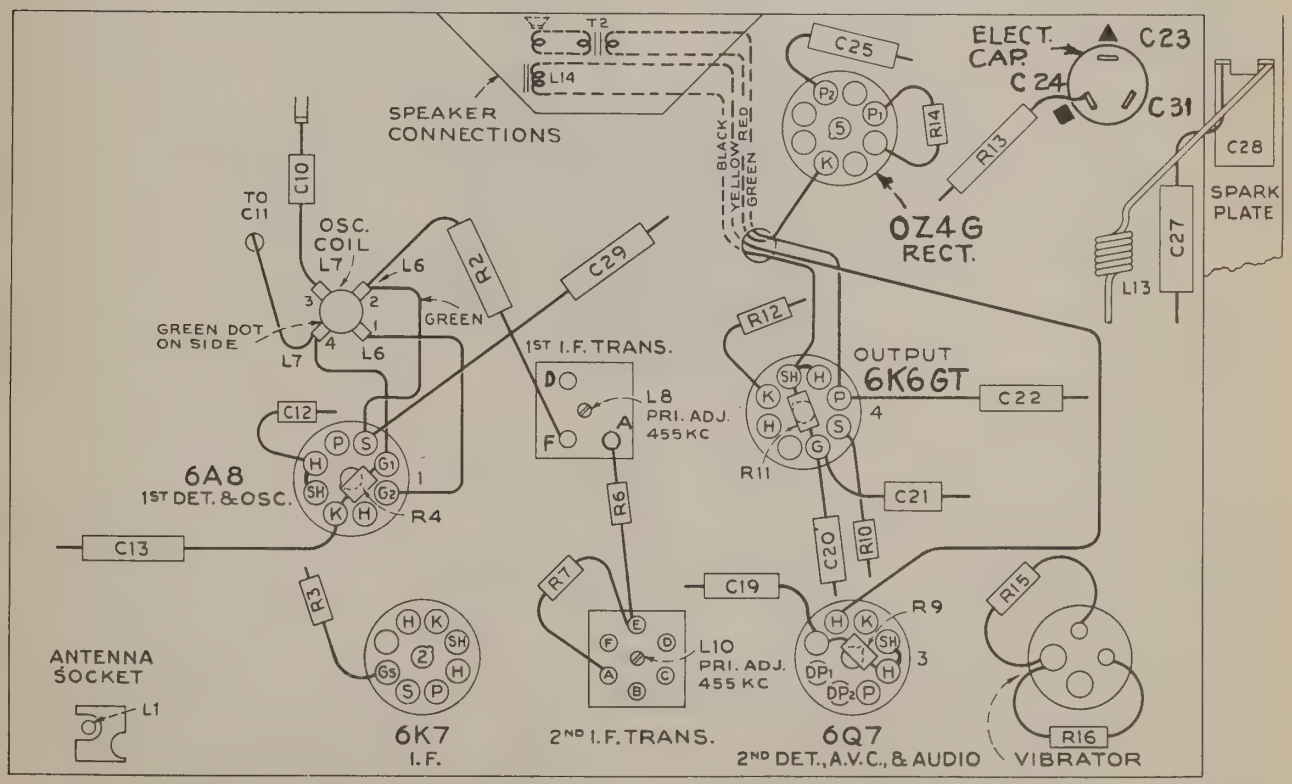
Antenna Filter



Drive Cord Hookup



Location of Parts and Alignment Adjustments on Top of Chassis



Location of Parts and Alignment Adjustments on Bottom of Chassis

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-357J)
13002	Capacitor—12 mmfd. (C1)
31728	Capacitor—37 mmfd. (C12)
12405	Capacitor—47 mmfd. (C16)
12629	Capacitor—56 mmfd. (C15)
14262	Capacitor—109 mmfd. (C14)
13894	Capacitor—390 mmfd. (C21)
30673	Capacitor—470 mmfd. (C18)
34250	Capacitor—490 mmfd. (C10)
33584	Capacitor—.005 mfd. (C19, C22)
30626	Capacitor—.0075 mfd. (C25)
4937	Capacitor—.01 mfd. (C2, C20)
4870	Capacitor—.025 mfd. (C9)
30882	Capacitor—.05 mfd. (C13)
4839	Capacitor—0.1 mfd. (C29)
12741	Capacitor—0.5 mfd. (C27)
32240	Capacitor—Electrolytic, 2 sections 10 mfd., and 1 section 20 mfd. (C23, C24, C31)
31596	Clip—Spring clip to hold oscillator coil
31977	Coil—Antenna filter (L1)
31594	Coil—Oscillator coil (L6, L7)
31595	Coil—Oscillator coil (L6, L7)
11765	Lamp—Dial lamp
30641	Lead—"A" lead
30540	Resistor—100 ohms, ½ watt (R15, R16)
14561	Resistor—220 ohms, ½ watt (R3)
30499	Resistor—470 ohms, ½ watt (R12)
6134	Resistor—1,200 ohms, 1 watt (R13)
12695	Resistor—15,000 ohms, ½ watt (R14)
13669	Resistor—22,000 ohms, 2 watts (R2)
12266	Resistor—39,000 ohms ½ watt (R7)
12286	Resistor—56,000 ohms, ½ watt (R4)
14983	Resistor—330,000 ohms, ½ watt (R10)
12285	Resistor—470,000 ohms, ½ watt (R11)
12679	Resistor—2.2 meg., ½ watt (R6)
13601	Resistor—10 meg., ½ watt (R9)
3584	Ring—R.F. coil retaining ring
31639	Socket—Dial lamp socket
31319	Socket—Tube socket
13686	Socket—Vibrator socket
14261	Transformer—First i-f transformer (L8, L9, C14, C15)
30672	Transformer—Second i-f transformer (L10, L11, C16, C18)
31597	Transformer—Vibrator power transformer (T1, L15, C26)
13688	Vibrator—Plug-in vibrator complete (L16)
31637	Volume control and power switch (R8, S1)
	SPEAKER ASSEMBLIES (Speaker 84391-1)
30781	Speaker—Complete
30783	Transformer—Output transformer (T2)

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES (Speaker 84391-3)
31771	Cone—Speaker cone and voice coil (L12)
31770	Speaker—Complete
31772	Transformer—Output transformer (T2)
	TUNING UNIT ASSEMBLIES
33666	Button—Push button
31766	Coil—Antenna coil—less shield (L2)
31604	Condenser—2-gang variable (C3, C4, C11)
31614	Cord—Variable condenser drive cord
31725	Drum—Indicator drum assembly
31610	Drum—Variable condenser drive cord drum
31612	Gear—Variable condenser drive gear sector—fastens on cam shaft
33665	Mechanism—Comprising 5 push arms, cams, cam plate, and mounting bracket assembled—less variable condenser
31606	Pulley—Indicator drum pulley
31607	Pulley—Pulley for indicator drum bracket
13471	Ring—Retaining ring for antenna coil
4389	Screw—No. 6-32 x 3/16-in. set screw for pulley, Stock No. 31606
31613	Screw—No. 8-32 x ⅜-in. set screw for gear, Stock No. 31612
31611	Screw—No. 8-32 x ¼-in. set screw for drum, Stock No. 31610
31609	Shaft—Station selector knob shaft
31615	Spring—Variable condenser drive cord tension spring
30585	Spring—Push button arm tension spring
2917	Washer—"C" washer to hold knob shaft
31608	Washer—"C" washer to hold pulley, Stock No. 31607
	MISCELLANEOUS ASSEMBLIES
4289	Body—Fuse holder body for ammeter lead
5025	Capacitor—Generator capacitor
33668	Case—Receiver case only
4291	Clip—Spring clip for amateur lead
31456	Covers—8-protective celluloid covers for call letter markers
33670	Dial—Dial scale and holder
4286	Ferrule—Bushing and ferrule for fuse holder
5023	Fuse—15 amp.
4290	Insulator—Insulating sleeve for fuse holder
33671	Knob—Volume control or tuning knob
7766	Lead—Ammeter lead complete with clip and fuse holder
31589	Markers—One set call letter markers for push buttons
33669	Mounting—Complete set mounting brackets, strap, washers, screws, bolts, and nuts
31660	Plate—Name plate
31646	Spring—Retaining spring for knobs
4284	Spring—Spring for fuse holder
5024	Suppressor—Distributor suppressor
4285	Washer—Insulating washer for fuse holder

First Edition

Printed in U. S. A.

RCA Victor

MODEL M60

Chassis No. RC 357K

Six-Tube, Push-Button, Superheterodyne Automobile Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 23 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

TUBES AND FUNCTIONS

(1) RCA-6K7 ..... R-F Amplifier
(2) RCA-6A8 ..... First Detector—Oscillator
(3) RCA-6K7 ..... I-F Amplifier
(4) RCA-6Q7 .. Second Detector, A-F Amplifier and A.V.C.
(5) RCA-6K6GT ..... Output
(6) RCA-0Z4G ..... Rectifier
Dial Lamp ..... 6-8 volts, 0.2 amp., Mazda 51

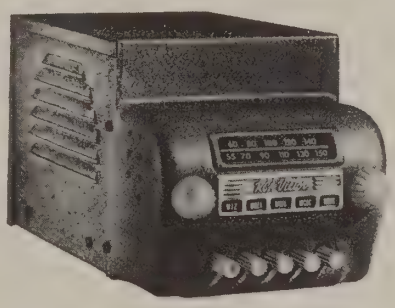
FREQUENCY RANGE ..... 550-1,550 kc

POWER SUPPLY RATING

Supply Voltage ..... 6.3 volts
Current Drain ..... 6.5 amperes
Fuse Protection ..... 15 ampere

POWER OUTPUT

Type ..... Pentode
Undistorted ..... 2.0 watts
Maximum ..... 3.5 watts



LOUDSPEAKER

Type ..... Electrodynamic
Size ..... 5 inches
Voice-Coil Impedance .... 3.2 ohms at 400 cycles

ALIGNMENT FREQUENCIES

I-F ..... 455 kc
Antenna ..... 1,400 kc
R-F ..... 1,400 kc
Oscillator ..... 600 kc

Mechanical Specifications

OPERATING CONTROLS

1. Left Knob ..... On-Off Switch and Volume
2. Push Buttons ..... Station Tuning
3. Right Knob ..... Manual Tuning, Ratio 2½-1

CONTROL OPERATION

Turn Right ..... Power On; Volume Increase
Push Button ..... Signal Tuned Automatically
Rotate ..... Signal Tuned Manually

Case Dimensions ..... Height ..... 6-in. Width ..... 6-in. Depth ..... 10¾-in.

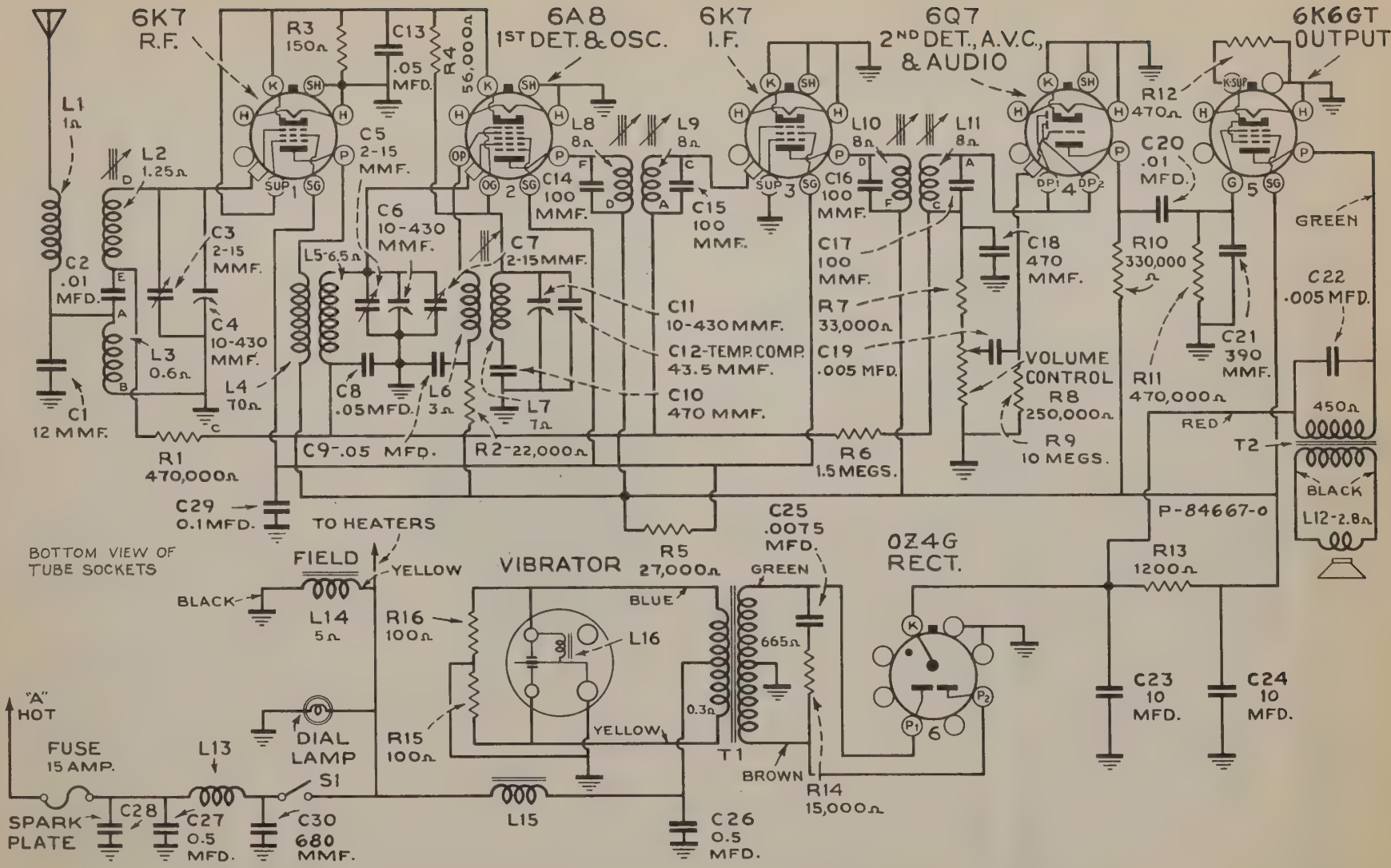
General Description

Model M60 is a six-tube superheterodyne receiver with loudspeaker and radio chassis in the same case. It is equipped with five push buttons, for tuning your five favorite broadcast stations, as well as the standard method of dial tuning. Adjustments for push button tuning are explained under the heading "Push Button Tuning Mechanism." The receiver is designed to be mounted under the dash panel. The operating controls are integral with the radio and speaker case.

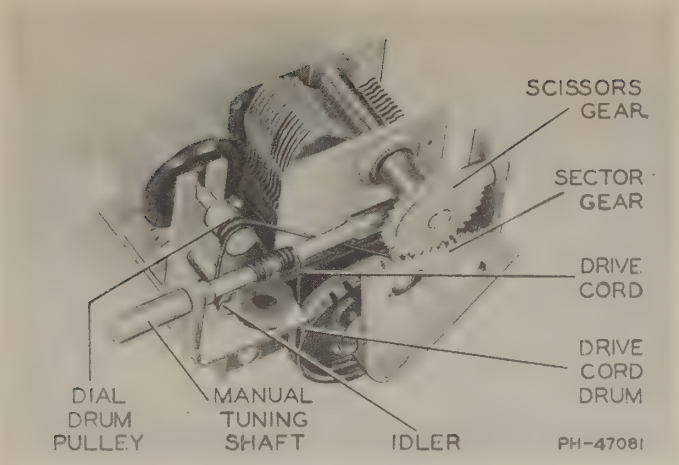
Loudspeaker.—The loudspeaker voice coil should be centered in the usual manner with three narrow paper feelers, after first removing the front dust cover. The dust cover should be cemented back in place with ambroid cement after adjustment has been completed.

First Edition

Printed in U. S. A.



Schematic Circuit Diagram



Tuning Mechanism

Antenna Circuit

The antenna circuit is designed to work with an antenna having a total capacity including the shielded lead-in not to exceed 150 mmf. If an antenna having a larger capacity is to be used, it will be necessary to add a capacitor in series with the lead from antenna filter L-1 to the antenna coil terminal ("A"). Where a "Double Under the Running Board" type of antenna is to be used having a capacity of approximately 200 mmf. the capacitor added should be approximately 300 mmf. The insulated running board type having an approximate capacity of 550 mmf. will require a capacitor of approximately 200 mmf. Cars using an insulated steel top of approximately 3,500 mmf. will require a series capacitor of 150 mmf.

After installation, and with antenna connected, tune in a weak station near 1,400 kc and adjust compensator trimmer (C-3) for maximum signal output. This trimmer is accessible by prying off the nameplate between the control knobs.

Antenna Filter

A filter is included in the antenna circuit. Being completely shielded, it prevents radiating ignition interference within the set. It also reduces the possibility of picking up vibrator interference. The filter unit is mounted inside a steel shell which in turn is welded to the chassis. The shielded antenna lead-in makes contact with the filter unit within the steel shell and is held in place by a bayonet type connector.

Push Button Tuning Mechanism

The push button tuning mechanism used in this receiver is of the mechanical type, wherein the movement of the button actually turns the tuning condenser to any pre-determined setting. The movement is actuated thru a Push-Arm, Cam, Rocker Plate and Sector Gear, which meshes with a Scissors Gear directly fastened to the tuning condenser shaft. The scissors gear prevents backlash between the sector gear and the tuning condenser. Since the sector gear is mounted directly on the rocker plate shaft, the position of the rocker plate will accurately determine the position of the tuning condenser.

Setting Up Stations

The push buttons should be adjusted for five favorite stations after the receiver is installed and operating.

Any standard broadcast stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push buttons one-half turn.
2. Using the tuning control, accurately tune in the first station.
3. With station accurately tuned in, press the first push button fully in and then gently release so as not to jar mechanism.
4. Tighten the push button securely with fingers. Do not force with pliers.
5. Proceed in same manner to adjust the other four push buttons.

Adjustments

The mechanism should be adjusted so that when using either manual or push-button tuning, it operates positively and without backlash or bind. The following hints will be found helpful in adjusting the mechanism properly.

1. With the gang condenser in full mesh, the sector gear should have the two end teeth fully meshed in the scissor gear.
2. The position of the sector gear on the rocker-plate shaft should be adjusted so that there is clearance between the rocker-plates and the frame of the push-button mechanism at both extremities of gang rotation. Thus correct adjustment prevents the rotation of the gang being limited by the rocker plates touching the frame.
3. The drive cord should have 8½ turns around the tuning shaft as shown in the illustration. Three degrees of adjustment of the tension on the drive cord may be obtained by use of the three positions for connecting the drive-cord-tension spring to the drive-cord drum on the condenser shaft as shown.
4. The push-arms, rocker-plate shaft, and pulleys should be lubricated with light grease (sparingly). Care should be taken to keep the lubricant off the drive cord.

Manual Tuning

A manual tuning knob is provided so that additional stations may be tuned in as desired. The manual tuning shaft is connected thru a cord drive to a drum on the rocker plate shaft. This same cord drives the dial drum by passing over a pulley on the drum shaft. A sketch shows the complete cord drive assembly and the correct number of turns which the cord should be wrapped around the drive shaft and dial drum pulley. Stops are provided on the dial drum so that dial scale adjustment is made by tuning the set to the extreme ends of the band.

Alignment Procedure

PRELIMINARY:

Output meter connections ..... Across speaker voice coil
Output meter readings to indicate 1 watt ..... 1.8 volts
Generator ground lead connections ..... To chassis
Dummy antenna value to be in series with generator output ..... See Chart Below
Connection of generator output lead ..... See Chart Below
Generator modulation ..... 30%, 400 cycles
Position of Volume Control ..... Fully clockwise

Position of Dial Pointer	Generator Frequency	Dummy Antenna	Generator Connection	Adjustment Symbol	Circuit Adjusted
No Signal 550-750 kc	455 kc	.001 mfd.	6K7 I.F. Grid	L-10, L-11	2nd I.F. Trans.
No Signal 550-750 kc	455 kc	.001 mfd.	6A8 Grid	L-8, L-9	1st I.F. Trans.
Rock Through 600 kc	600 kc	.0001 mfd.†	Ant. Lead	L-7	Osc.
1,400 kc **	1,400 kc	.0001 mfd.†	Ant. Lead	C-5	Det.
1,400 kc **	1,400 kc	.0001 mfd.†	Ant. Lead	C-3	Ant.
Rock Through 600 kc	600 kc	.0001 mfd.†	Ant. Lead	L-7	Osc.
1,400 kc **	1,400 kc	.0001 mfd.†	Ant. Lead	C-5	Det.
1,400 kc **	1,400 kc	.0001 mfd.†	Ant. Lead	C-3*	Ant.

IMPORTANT ALIGNMENT NOTES

† Make the generator connection to the receiver through a shielded lead-in having not more than 50 mmf. (.00005) capacity with a male connector attached for connection to antenna socket. If a capacitor has been added in series with the lead from antenna filter L-1 to the antenna coil, as outlined under "Antenna Circuit," for reason of a high capacity antenna, the Dummy Antenna should be the same value as the antenna itself.

* Re-adjust C-3 after installation as outlined under "Antenna Circuit".

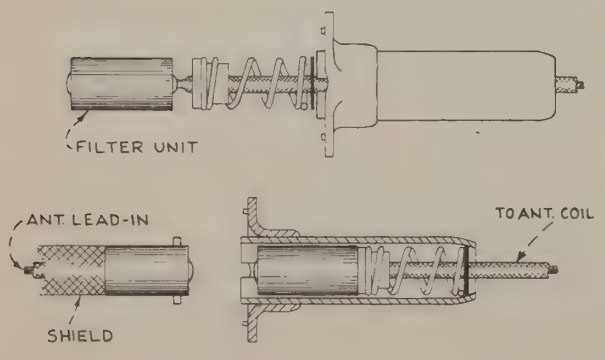
Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value, to prevent the A.V.C. action of the receiver from interfering with accurate alignment.

Alignment adjustment locations are shown on the top and bottom parts location views of chassis.

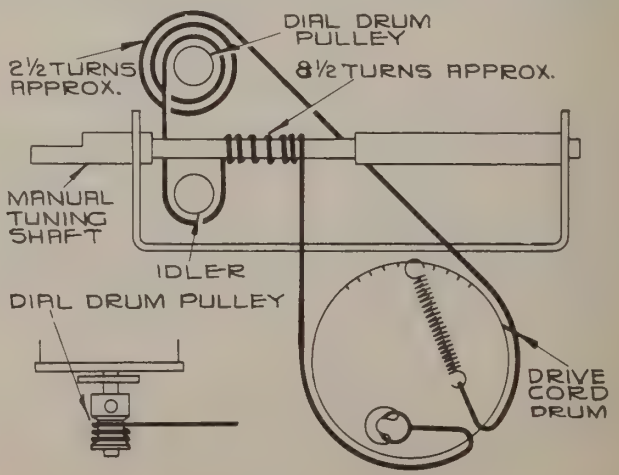
Only the dummy antenna indicated in the chart for any particular frequency should be used. Grid cap leads should remain in place during alignment.

** OSCILLATOR CIRCUIT

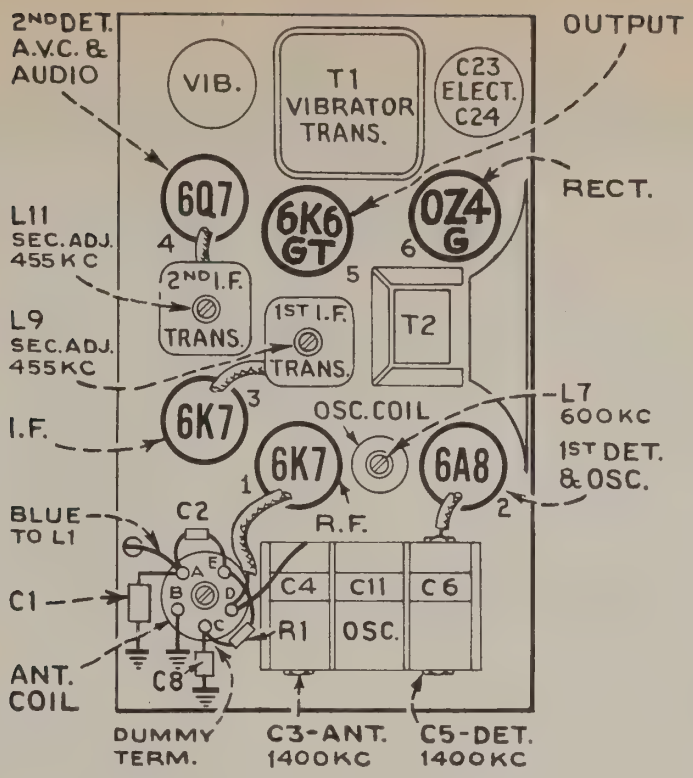
A magnetite core is used to provide temperature stability. The conventional high frequency trimmer has been replaced with a fixed temperature-compensating capacitor (C-12) which determines the high frequency range. Since the inductance of L-7 is adjustable, the conventional series trimmer has been replaced with a fixed capacitor (C-10). C-10 is a special capacitor having zero temperature coefficient to provide for oscillator stability in the low frequency range. Aligning the receiver for 600 kc is accomplished by adjusting L-7 to the antenna and det. circuits (gang condenser must be rocked while making this adjustment). The 1,400 kc alignment is accomplished by adjusting the antenna and the det. trimmers (C-3 and C-5) to the oscillator.



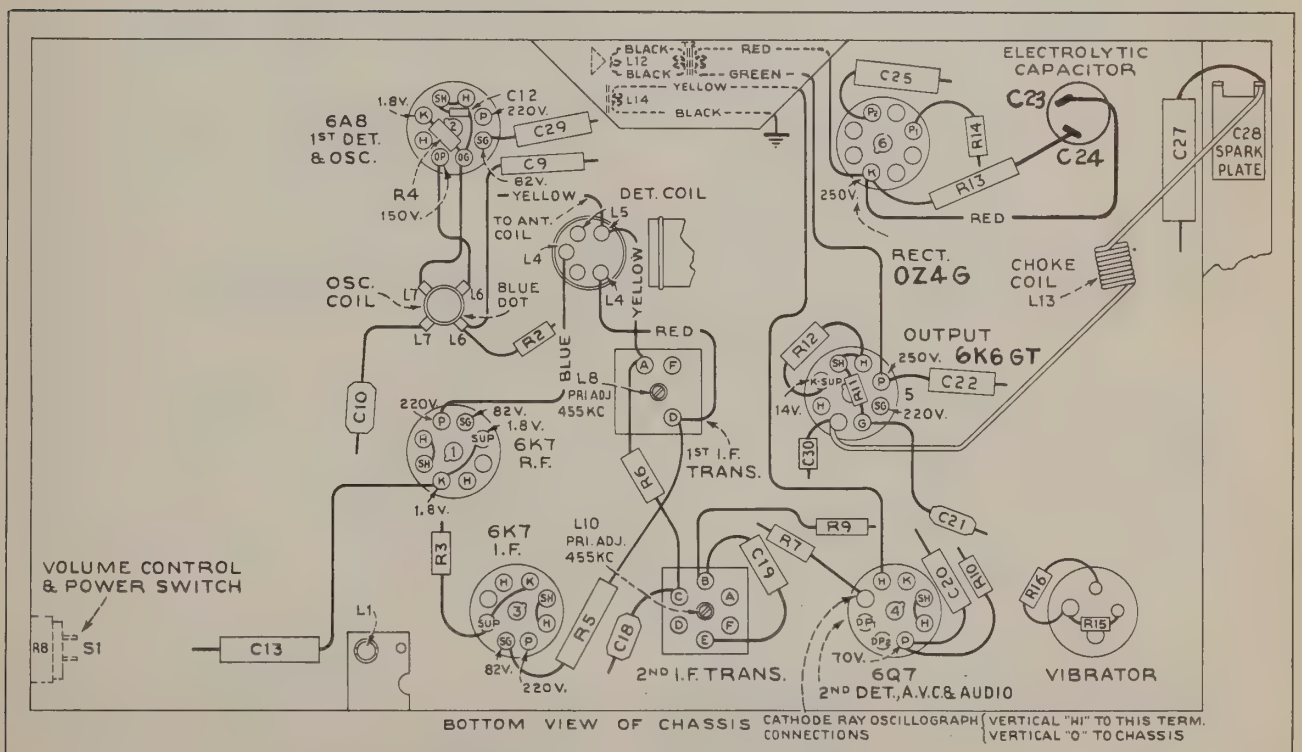
Antenna Filter



Drive Cord Hookup



Top View of Chassis



Bottom View of Parts and Socket Voltages

(Measured at 6.3 volts battery supply—Volume control minimum—No signal input—)

To duplicate the conditions under which the above voltages were measured requires a 1,000-ohm-per-volt d-c meter having ranges of 10, 50, 250, and 500 volts. Use the nearest range above the indicated voltage value. Each value should hold within ± 20% when the receiver is normally operative at its rated battery voltage.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-357K)
13002	Capacitor—12 mmfd. (C1)
31729	Capacitor—43.5 mmfd., temp. comp. (C12)
30904	Capacitor—100 mmfd. (C14, C15, C16, C17)
13894	Capacitor—390 mmfd. (C21)
14497	Capacitor—680 mmfd. (C30)
33584	Capacitor—.005 mfd. (C19, C22)
30626	Capacitor—.0075 mfd. (C25)
14393	Capacitor—.01 mfd. (C2)
4937	Capacitor—.01 mfd. (C20)
32787	Capacitor—.05 mfd. (C8, C9)
30882	Capacitor—.05 mfd. (C13)
4839	Capacitor—0.1 mfd. (C29)
12741	Capacitor—0.5 mfd. (C27)
33803	Capacitor—Electrolytic, 2 sections 10 mfd. each (C23, C24)
32363	Capacitor—470 mfd. (C10, C18)
31596	Clip—Spring clip to hold oscillator coil
33664	Coil—Antenna coil (L2, L3)
31977	Coil—Antenna filter (L1)
31595	Coil—Oscillator coil (L6, L7)
31600	Coil—R.F. coil—less shield (L4, L5)
11765	Lamp—Dial lamp
30641	Lead—"A" lead
30540	Resistor—100 ohms, ½ watt (R15, R16)
13428	Resistor—150 ohms, ½ watt (R3)
30499	Resistor—470 ohms, ½ watt (R12)
6134	Resistor—1,200 ohms, 1 watt (R13)
12695	Resistor—15,000 ohms, ½ watt (R14)
13998	Resistor—22,000 ohms, ½ watt (R2)
13477	Resistor—27,000 ohms, 1 watt (R5)
12454	Resistor—33,000 ohms, ½ watt (R7)
12286	Resistor—56,000 ohms, ½ watt (R4)
14983	Resistor—330,000 ohms, ½ watt (R10)
12285	Resistor—470,000 ohms, ½ watt (R1, R11)
12201	Resistor—1.5 meg., ½ watt (R6)
13601	Resistor—10 meg., ½ watt (R9)
3584	Ring—R.F. coil retaining ring
31639	Socket—Dial lamp socket
31319	Socket—Tube socket
13686	Socket—Vibrator socket
30902	Transformer—First i-f transformer (L8, L9, C14, C15)
31593	Transformer—Second i-f transformer (L10, L11, C16, C17)
31597	Transformer—Vibrator power transformer (T1, L15, C26)
13688	Vibrator—Plug-in vibrator complete (L16)
31638	Volume control and power switch (R8, S1)
	SPEAKER ASSEMBLIES (Speaker 84391-1)
30781	Speaker—Complete
30783	Transformer—Output transformer (T2)

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES (Speaker 84391-3)
31771	Cone—Speaker cone and voice coil (L12)
31770	Speaker—Complete
31772	Transformer—Output transformer (T2)
	TUNING UNIT ASSEMBLIES
33667	Button—Push button
31605	Condenser—3-gang variable (C3, C4, C5, C6, C7, C11)
31614	Cord—Variable condenser drive cord
31725	Drum—Indicator drum assembly
31610	Drum—Variable condenser drive cord drum
31612	Gear—Variable condenser drive gear sector—fastens on cam shaft
33665	Mechanism—Comprising 5 push arms, cams, cam plate, and mounting bracket assembled—less variable condenser
31606	Pulley—Indicator drum pulley
31607	Pulley—Pulley for indicator drum bracket
13471	Ring—Retaining ring for antenna coil
4389	Screw—No. 6-32 x 3/16-in. set screw for pulley, Stock No. 31606
31613	Screw—No. 8-32 x ⅛-in. set screw for gear, Stock No. 31612
31611	Screw—No. 8-32 x ¼-in. set screw for drum, Stock No. 31610
31609	Shaft—Station selector knob shaft
31615	Spring—Variable condenser drive cord tension spring
30585	Spring—Push button arm tension spring
2917	Washer—"C" washer to hold knob shaft
31608	Washer—"C" washer to hold pulley, Stock No. 31607
	MISCELLANEOUS ASSEMBLIES
4289	Body—Fuse holder body for ammeter lead
5025	Capacitor—Generator capacitor
33668	Case—Receiver case only
4291	Clip—Spring clip for ammeter lead
31456	Covers—8-protective celluloid covers for call letter markers
33670	Dial—Dial scale and holder
4286	Ferrule—Bushing and ferrule for fuse holder
5023	Fuse—15 amp.
4290	Insulator—Insulating sleeve for fuse holder
33672	Knob—Volume control or tuning knob
7766	Lead—Ammeter lead complete with clip and fuse holder
31589	Markers—One set call letter markers for push buttons
33669	Mounting—Complete set mounting brackets, strap, washers, screws, bolts, and nuts
31646	Spring—Retaining spring for knobs
4284	Spring—Spring for fuse holder
5024	Suppressor—Distributor suppressor
4285	Washer—Insulating washer for fuse holder

RCA Victor

MODEL M-70

Chassis No. RC-394

Seven-Tube, Push-Button, Superheterodyne Automobile Receiver

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 12—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

RCA Tube Complement

(1) RCA-6K7 ..... R-F Amplifier
(2) RCA-6A8 ..... First Detector—Oscillator
(3) RCA-6SK7 ..... I-F Amplifier
(4) RCA-6R7 ..... Second Det., A-F Amp., and A.V.C.
(5) RCA-6V6-G ..... Power Output
(6) RCA-6V6-G ..... Power Output
(7) RCA-0Z4-G ..... Rectifier

Tuning Range ..... 550 to 1,550 kc

Intermediate Frequency ..... 260 kc

Power Output Ratings

Maximum ..... 8 watts
Undistorted ..... 6 watts

Loudspeaker

Type ..... Electrodynamic
Voice-Coil Impedance ..... 3 ohms at 400 cycles

Power Supply Rating

Supply Voltage ..... 6.3 volts
Current Drain ..... 8.7 amperes
Fuse Protection ..... 15 ampere

Pilot Lamp ..... Mazda No. 51, 6-8 volts, 0.2 ampere

Mechanical Specifications

Receiver Case Dimensions ..... Height, 2½ inches; Width, 5⅞ inches; Depth, 9¼ inches

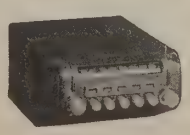
Speaker Case Dimensions ..... Diameter, 9½ inches; Depth, 5 inches

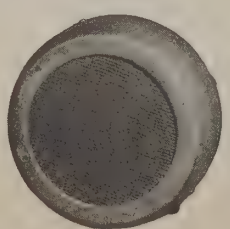
Operating Controls ..... (Left)—(Plastic Knob) Power-Volume; (Wing Knob) Tone; (Center)—Five Station Push Buttons; (Right)—Manual Tuning; Ratio 7½ - 1.

Weight ..... Net, 20 pounds; Shipping, 22 pounds

General Description

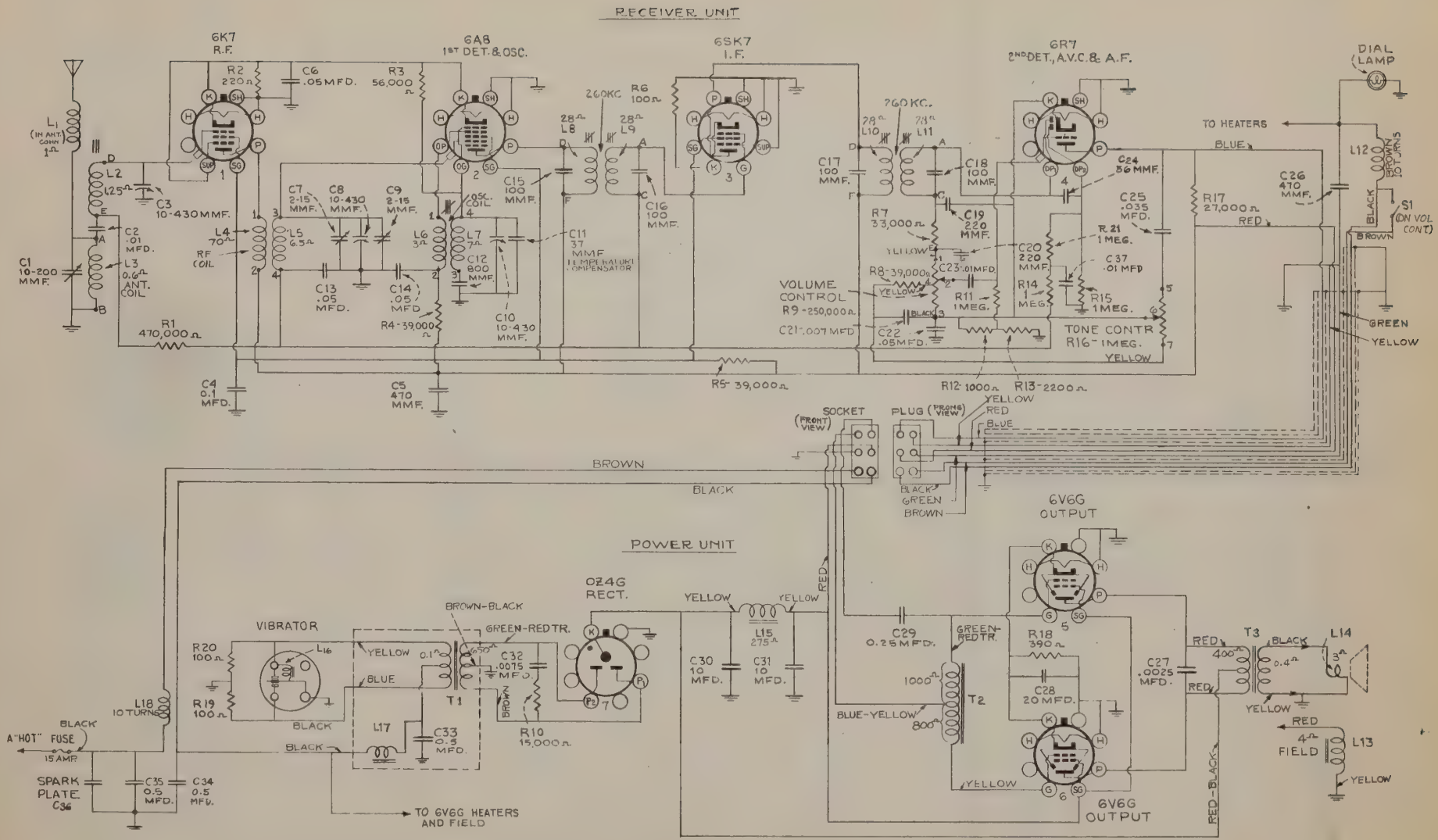
Model M-70 consists of a 7-tube, superheterodyne automobile receiver and an eight-inch electrodynamic loudspeaker built in two separately housed components. A small tuning unit for mounting under the instrument panel contains four tubes, while the cylindrical loudspeaker housing for firewall mounting contains three tubes. Design features include an R-F amplifier stage; antenna filter and antenna trimmers; magnetite core antenna, oscillator and I-F transformers; delayed automatic volume control; combined high- and low-frequency tone control; compensated volume control; true tone fidelity; five push button tuning; full-vision, edge-lighted glass dial; illuminated station call letters and a push-pull beam power output stage.





First Edition

Printed in U. S. A.



Schematic Circuit Diagram

Push Button Adjustment

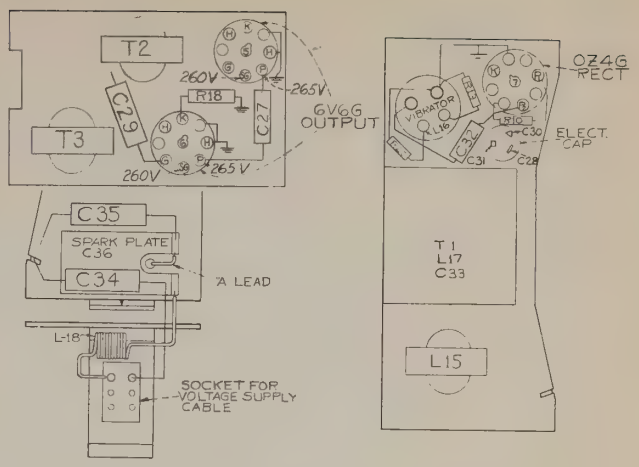
The push buttons should be adjusted for five favorite stations after the receiver is installed and operating.

Any standard broadcast stations may be chosen. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

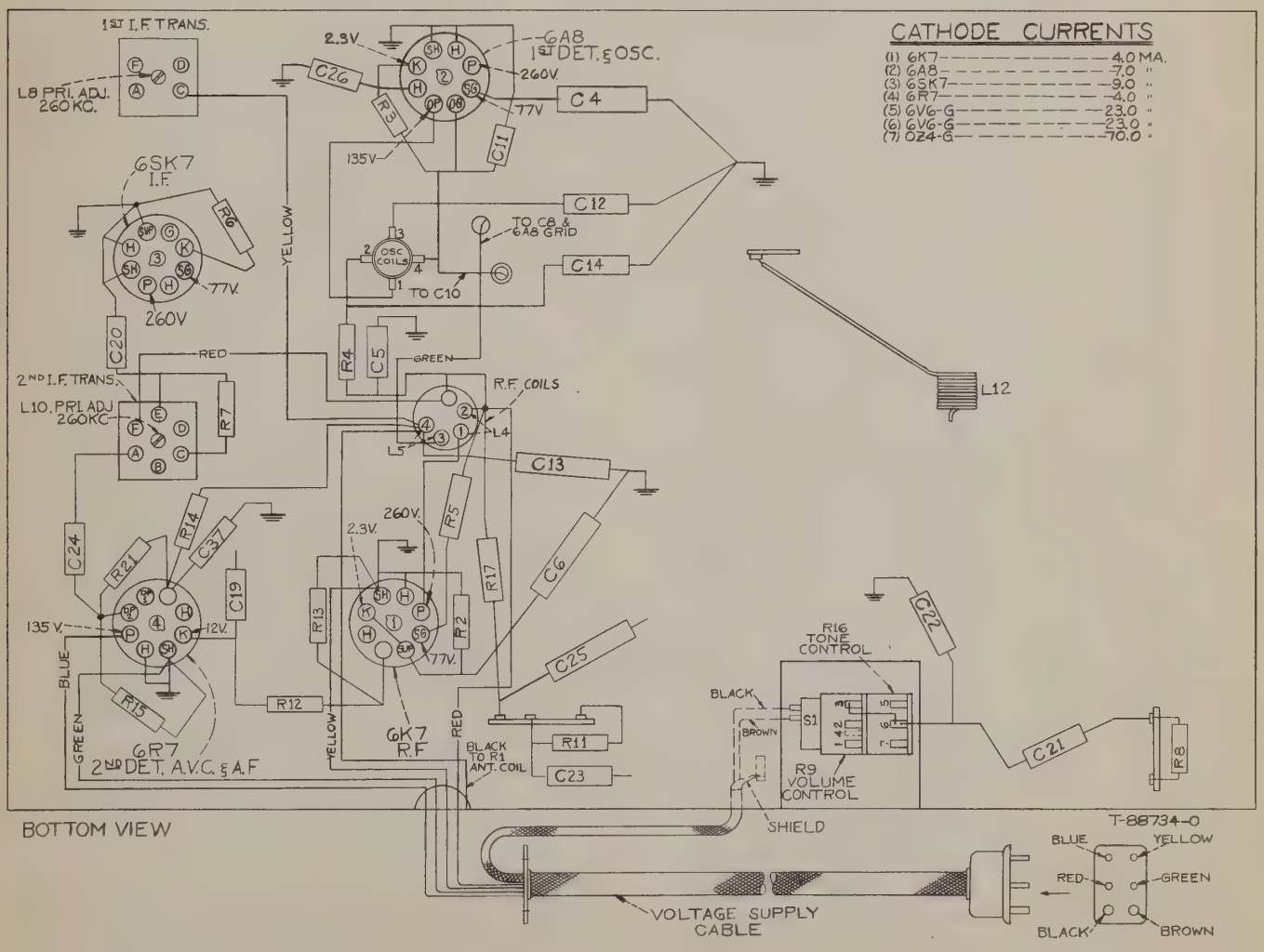
1. Loosen the push buttons one-half turn.
2. Using the tuning control, accurately tune in the first station.
3. With station accurately tuned in, press the first push button fully in and then gently release so as not to jar mechanism.
4. Tighten the push button securely with fingers. Do not force with pliers.
5. Proceed in same manner to adjust the other four push buttons.

Loudspeaker

The loudspeaker cone may be centered in the usual manner with three celluloid or paper feelers after gently cutting away the front dust cover. A new cover should be cemented in place upon completion of the adjustment.



Power Unit Parts and Socket Voltages



Receiver Unit Parts and Socket Voltages

Alignment Procedure

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis, and keep the output signal as low as possible to avoid a-v-c action.

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are as follows: Vertical "H1" to terminal "C" on 2nd I-F transformer; vertical "0" to chassis.

Output Meter. — Connect the output meter across the speaker voice-coil and turn the receiver volume control to maximum (fully clockwise) and tone control to middle of range.

Dial Calibration.—Rotate the gang condenser to its full-mesh (maximum-capacity) position and then adjust dial scale so that the pointer is aligned to the last calibration mark at the low-frequency end of the scale.

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6SK7 I-F grid (No. 4 pin) in series with .01 mfd.	260 kc	No Signal 550-750 kc	L10 and L11 (2nd I-F Trans.)
2	6A8 Det. grid cap in series with .01 mfd.	260 kc		L8 and L9 (1st I-F Trans.)
3 †	* Ant. connector in series with 60 mmfd.	600 kc	600 kc	L7 (osc.)
4 †	* Ant. connector in series with 60 mmfd.	1,400 kc	1,400 kc signal	C7 (det.) C1 (ant.)
5 †	* Ant. connector in series with 60 mmfd.	600 kc	600 kc (rock)	L7 (osc.)
6 †	* Ant. connector in series with 60 mmfd.	1,400 kc	1,400 kc signal	C7 (det.) C1 (ant.)**

*** Note 1.**—This 60 mmfd. capacitor must be inserted at the antenna connector of the receiver. The lead from the test oscillator to the 60 mmfd. capacitor may be shielded if desired, but no shielding should be used between capacitor and antenna connector.

† Note 2.—These adjustments should be made with unit enclosed in its shielded case, through holes provided for adjustment purposes.

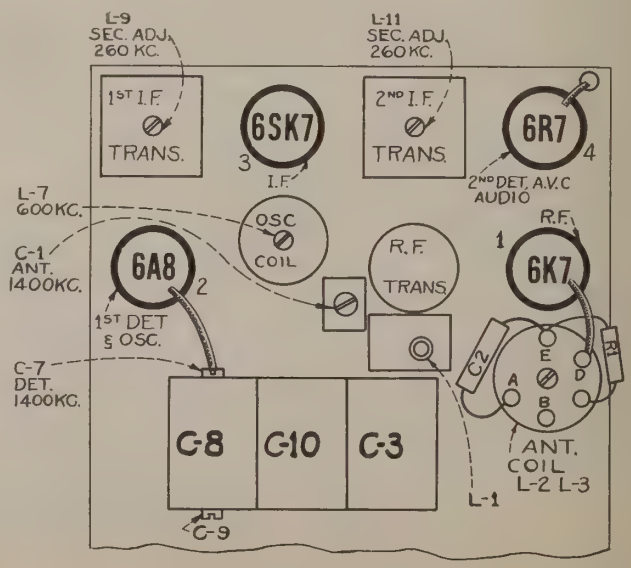
**** Note 3.**—Final adjustment of C1 must be made after the receiver has been installed and the antenna connected. See "Antenna Circuit."

Antenna Circuit

It is very important that these instructions be followed when installing the M-70 receiver.

The antenna circuit is designed to work with an antenna having a total capacity including the shielded lead-in not to exceed 150 mmf. If an antenna having a larger capacity is to be used, it will be necessary to add a capacitor in series with the lead from the antenna filter L-1 to the antenna coil terminal ("A"). Where a "Double Under the Running Board" type of antenna is to be used having a capacity of approximately 200 mmf., the capacitor added should be approximately 500 mmf. The insulated running board type having an approximate capacity of 550 mmf. will require a capacitor of approximately 150 mmf. Cars using an insulated steel top of approximately 3,500 mmf. will require a series capacitor of 150 mmf.

After installation and with antenna connected, tune in a weak station near 1,400 kc and adjust compensator trimmer C-1 for maximum signal output. This trimmer is accessible by removing plug button near antenna jack on top of receiver. If a maximum (peak) signal output cannot be obtained in the range of the antenna trimmer, the effective capacity should be checked and compensated for by varying series capacity as described above.

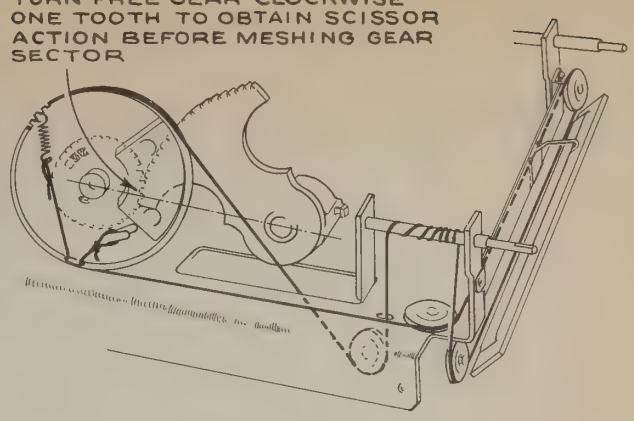


Receiver Unit, Tubes and Trimmers

Adjustment of Push-Button Mechanism

The mechanism should be adjusted so that when using either manual or push-button tuning, it operates positively and without backlash or bind. The following hints will be found helpful in adjusting the mechanism properly.

1. With the gang condenser in full mesh, the sector gear should have the two end teeth fully meshed in the scissor gear, as shown in the illustration.
2. The position of the sector gear on the rocker-plate shaft should be adjusted so that there is clearance between the rocker-plates and the frame of the push-button mechanism at both extremities of gang rotation. Thus correct adjustment prevents the rotation of the gang being limited by the rocker plates touching the frame.
3. The drive cord should have 6½ turns around the tuning shaft as shown in the illustration. Three degrees of adjustment of the tension on the drive cord may be obtained by use of the three positions for connecting the drive-cord-tension spring to the drive-cord drum on the condenser shaft as shown.
4. The push-arms, rocker-plate shaft, and pulleys should be lubricated with light grease (sparingly). Care should be taken to keep the lubricant off of the drive cord.



Drive Cord Hookup

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES (RC-394)
32973	Button—Push button
32979	Capacitor—Adjustable trimmer, 15-150 Mmfd. (C1)
31728	Capacitor—37 Mmfd. (C11 temperature compensating)
12723	Capacitor—56 Mmfd. (C24)
30904	Capacitor—100 Mmfd. (C15, C16, C17, C18)
12694	Capacitor—220 Mmfd. (C19, C20)
30433	Capacitor—470 Mmfd. (C5, C26)
33052	Capacitor—800 Mmfd. (C12)
5148	Capacitor—.007 Mfd. (C21)
14393	Capacitor—.01 Mfd. (C2, C37)
4937	Capacitor—.01 Mfd. (C23)
5196	Capacitor—.035 Mfd. (C25)
32787	Capacitor—.05 Mfd. (C6, C13, C14, C22)
4839	Capacitor—0.1 Mfd. (C4)
31601	Coil—Antenna coil—less shield (L2, L3)
31977	Coil—Antenna choke coil (L1)
32977	Coil—Oscillator coil—less shield (L6, L7)
32978	Control—Volume control, tone control, and power switch (R9, R16, S1)
31600	Coil—R.F. coil—less shield (L4, L5)
32974	Condenser—3-gang variable tuning with gear (C3, C7, C8, C9, C10)
32634	Cord—Drive cord
32975	Dial—Dial scale only—less frame
32982	Drum—Variable condenser drive drum
32976	Frame—Dial scale frame and holder
32290	Gear—Tuning unit gear sector
32985	Indicator—Dial indicator pointer
11765	Lamp—Dial lamp
32981	Pulley—Drive cord pulley (1) and bracket
32980	Pulley—Drive cord pulleys (2) and bracket
14439	Resistor—100 ohms, ½ watt (R6)
14561	Resistor—220 ohms, ½ watt (R2)
14720	Resistor—1,000 ohms, ½ watt (R12)
13716	Resistor—2,200 ohms, ½ watt (R13)
30409	Resistor—27,000 ohms, ½ watt (R17)
12454	Resistor—33,000 ohms, ½ watt (R7)
12266	Resistor—39,000 ohms, ½ watt (R4, R8)
30434	Resistor—39,000 ohms, 1 watt (R5)
12286	Resistor—56,000 ohms, ½ watt (R3)
12285	Resistor—470,000 ohms, ½ watt (R1)
13730	Resistor—1 Meg., ½ watt (R11, R14, R15, R21)
13471	Ring—Retaining ring for antenna coil shield
3584	Ring—Retaining ring for R.F. coil
14350	Screw—No. 8-32 x 3/16 sq. hd. set screw for drum
31482	Screw—No. 8-32 x ¼ sq. hd. set screw for gear sector
32983	Shaft—Tuning knob shaft
32302	Shield—Antenna coil shield
12883	Shield—Oscillator coil shield
32984	Slide—Dial pointer slide rail
31364	Socket—Dial lamp socket
32299	Socket—Octal base tube socket
30585	Spring—Push button arm spring
31615	Spring—Drive cord tension spring
32990	Transformer—First I.F. transformer (L8, L9, C15, C16)
32991	Transformer—Second I.F. transformer (L10, L11, C17, C18)
32972	Tuner—Tuning mechanism—comprising push arms, and cam plates, assembled in metal frame—less push buttons
2917	Washer—"C" washer for tuning shaft
	POWER UNIT ASSEMBLY
32240	Capacitor—Electrolytic—2 sections 10 mfd., one section 20 Mfd. (C28, C30, C31)
5107	Capacitor—.0025 Mfd. (C27)
30626	Capacitor—.0075 Mfd. (C32)
30965	Capacitor—0.25 Mfd. (C29)
12741	Capacitor—0.5 Mfd. (C34, C35)
30641	Lead—"A" lead complete with male section of fuse holder
33064	Reactor—Filter reactor (L15)
30540	Resistor—100 ohms, ½ watt (R19, R20)
31388	Resistor—390 ohms, 1 watt (R18)
12695	Resistor—15,000 ohms, ½ watt (R10)
13686	Socket—4-contact vibrator socket
33063	Socket—6-contact socket for power cable
32299	Socket—Octal base tube socket
32243	Transformer—Driver transformer (T2)
32241	Transformer—Output transformer (T3)
32986	Transformer—Vibrator power transformer (T1, L17, C33)
13688	Vibrator—Plug-in unit (L16)
	SPEAKER ASSEMBLIES
32988	Case—Speaker and power unit case—less screen
33017	Cone—Speaker cone and voice coil (L14)
32989	Screen—Speaker case grille and screen
12252	Screw—No. 8 x ¼ self-tapping screw for speaker case
32987	Speaker unit only (L13, L14)
	MISCELLANEOUS ASSEMBLIES
32755	Button—Plug button for receiver case
5025	Capacitor—Generator capacitor, .5 Mfd.
32992	Case—Receiver case—less push button escutcheon
4291	Clip—Ammeter clip
31456	Cover—8 celluloid covers for station call letter markers
32994	Escutcheon—Push button escutcheon
5023	Fuse—15 amperes
4290	Insulator—Fuse insulator sleeve
32996	Knob—Dummy knob
32995	Knob—Tone control and switch knob
32993	Knob—Volume control, or tuning knob
7766	Lead—Ammeter lead and clip
31589	Marker—Push button station marker
32998	Mounting—Complete set of hardware for mounting speaker unit
32997	Mounting—Complete set of hardware for mounting receiver unit
32317	Screw—No. 8-32 x 7/32 set screw for volume control or tuning knob
12252	Screw—No. 8 x ¼-in. lg. self-tapping screw for speaker case
5024	Suppressor—Distributor suppressor
32769	Washer—Felt washer for under knob

RCA Victor

MODEL TRK-5 and MODEL TT-5

Chassis Nos. KC-3C, RC-429, RS-89A. Chassis No. KC-3B

Seventeen-Tube, AC, Superheterodyne, Five-Television-Channel Receiver with Eight-Tube, Three-Band, AC, Superheterodyne, Broadcast Receiver AND Seventeen-Tube, AC, Superheterodyne, Five-Television-Channel Table Model Attachment

for

105-125 Volts—50-60 Cycle Power Supply

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 19A—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

This sheet supplements the Service Data (1939—No. 19) for Models TRK-5 and TT-5 designed for 60 cycle power supply operation only.

General differences are outlined as follows:

(Refer to accompanying schematic for details of wiring changes.)

Chassis KC-3C and KC-3B

1. Capacitor C-96 (30 mfd.) added in parallel with C-47 across 6V6 Video Amplifier plate supply.

2. Resistor R-102 (1200 ohms) and capacitor C-97 (30 mfd.) added as a filter in 300 volt supply to deflection circuits.

3. Capacitor C-98 (20 mfd.) added in parallel with C-48 as Kinescope cathode bypass.

4. Capacitor C-99 (0.05 mfd.) added in parallel with C-86 first filter capacitor in Kinescope anode supply.

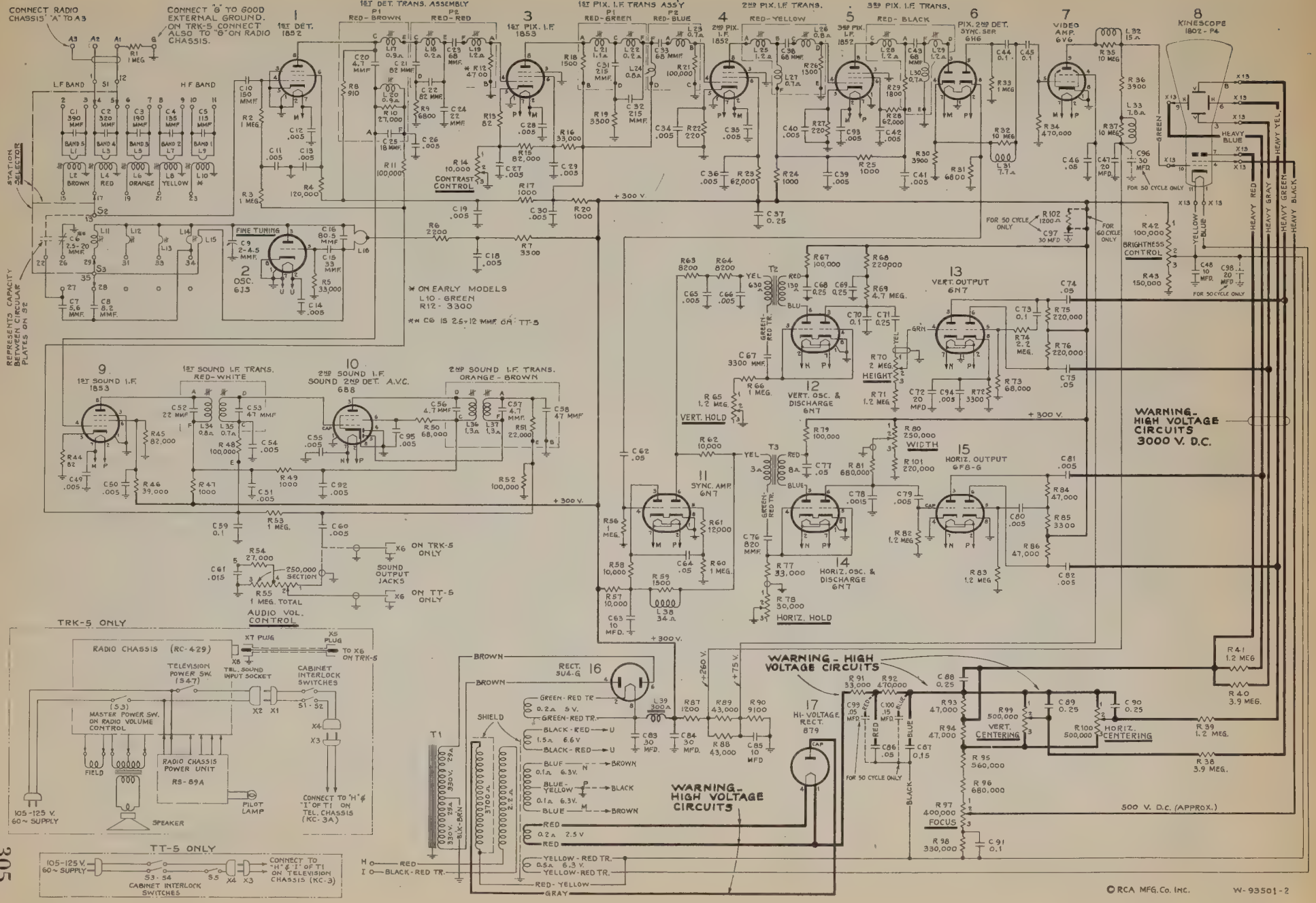
5. Capacitor C-100 (0.15 mfd.) added in parallel with C-87 second filter capacitor in Kinescope anode supply.

In addition a special Kinescope shield is used on these instruments for 50/60 cycle operation. This shield may be identified by a 1/8 inch diameter hole in the outer shield near the mounting bracket at the small end of the shield. Do not jar or drop the shield, and keep it away from the loudspeaker field to prevent magnetization.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers. Refer to Model TRK-5 and TT-5 (60 cycle) Service Data (1939—No. 19) for all Replacement Parts, except as listed below.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	TELEVISION CHASSIS ASSEMBLIES KC-3C in TRK-5 (50/60 cycle) KC-3B in TT-5 (50/60 cycle)		34599	Capacitor—30-30 mfd., 450 volt (C-96, C-97) 20 mfd., 350 volt (C-98).....	
33020	Capacitor—0.05 mfd., 3000 volt (C-99) 0.15 mfd., 2500 volt (C-100).....		30731	Resistor—1200 ohms, ½ watt (R-102).....	



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RCA Victor

MODEL TRK-9 and MODEL TRK-12

Chassis Nos. KC-4C, KK-7E, RC-427A, RS-83E; Chassis Nos. KC-4B, KK-7D, RC-427, RS-83E

AC, Superheterodyne, High-Picture-Definition, Five-Television-Channel, Receiver

and

Twelve-Tube, Three-Band, Electric Tuning, AC, Superheterodyne Broadcast Receiver

for

105-125 Volts—50-60 Cycle Power Supply

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 17A—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

This sheet supplements the Service Data (1939—No. 17) for Models TRK-9 and TRK-12 designed for 60 cycle power supply operation only.

General differences are outlined as follows:

(Refer to accompanying schematic and schematic for 60 cycle operation for details of wiring changes.)

Chassis KC-4B and KC-4C

1. Tube No. 21 formerly RCA-5V4G changed to RCA-25Z6 and socket wiring revised.
2. Capacitor C-61 not connected. Its function performed by an added capacitor C-117 (4 mfd-450 v.)

Chassis KK-7D and KK-7E

1. Capacitors C-118 (80 mfd.) and C-119 (10 mfd.) added in parallel with C-110.
2. Capacitor C-120 (0.25 mfd.) added in parallel with resistor R-126.
3. Capacitors C-116 (0.03 mfd.) and C-117 (0.03 mfd.) changed to C-121 (0.1 mfd.) and C-122 (0.1 mfd.)
4. Power transformer (T-5) changed to (T-8) having a 25v. heater winding to supply the RCA-25Z6 horizontal damping tube.
5. High voltage power transformer (T-6) changed to (T-9) and input power supply wiring changed to permit use of ¾ ampere fuse.

In addition special shielding is provided as follows:

1. A metallic conical section is installed in the cabinet to shield the Kinescope bulb.
2. A double metallic cylindrical section is installed with the deflecting yoke mounting assembly to shield the deflecting yoke proper. The accompanying illustration shows its assembly.

CAUTION: The conical shield is of the proper size to permit installing the 1803P4 Kinescope with its protective sleeve or shield. Therefore the latter should **never** be removed.

To prevent Kinescope breakage, when installing a Kinescope, the deflecting yoke and shield assembly must be in place. To prevent breakage of Kinescope when removing the deflecting yoke and shield assembly the Kinescope must be removed first.

IMPORTANT PRECAUTIONS

Do not attempt to measure the high voltage (7,500 volts).

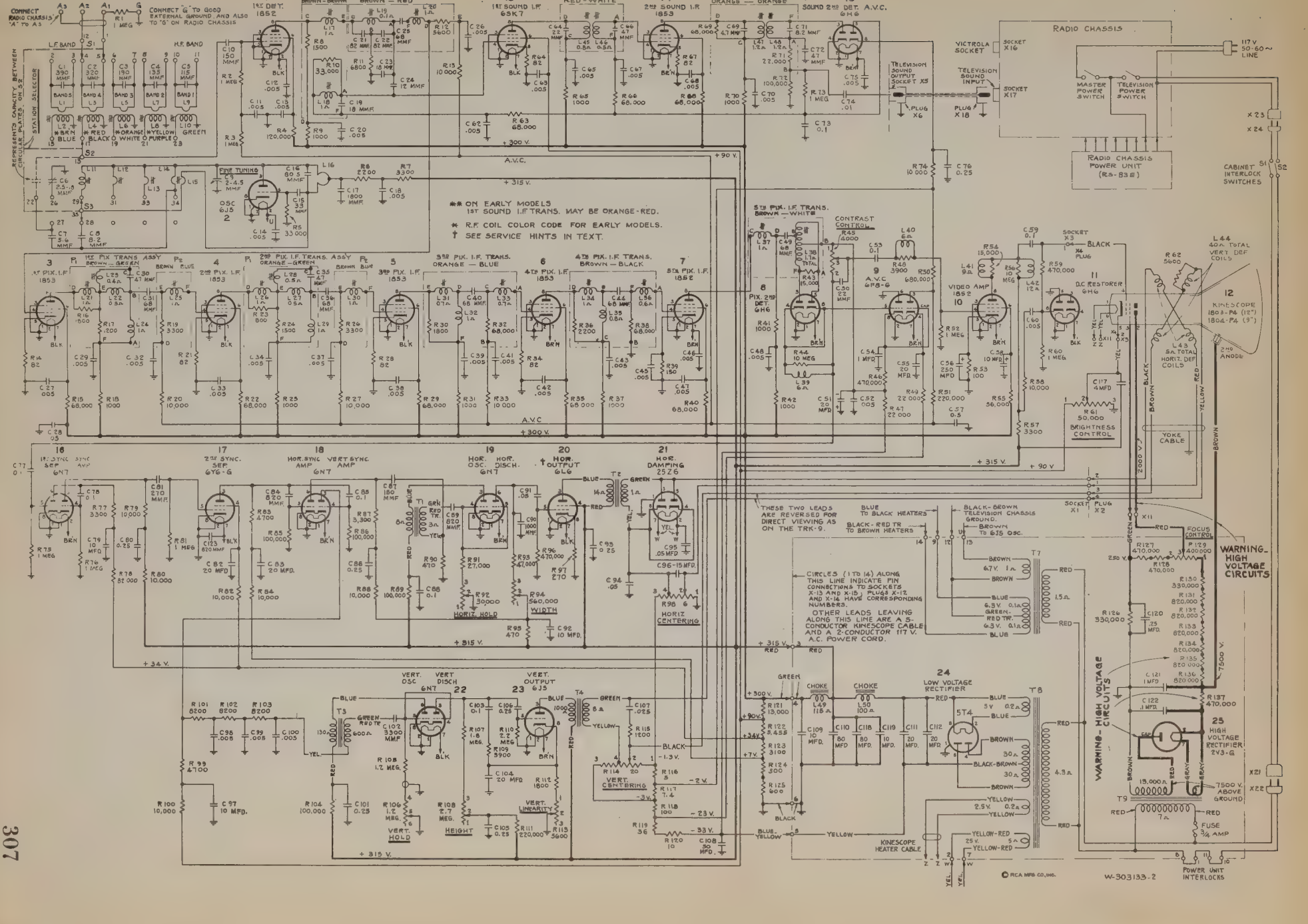
ALWAYS replace the red can over the 2V3-G high voltage rectifier. The most dangerous portion of the H.V. supply is the plate lead of the 2V3-G tube.

Do not eliminate the protection afforded by the interlock switches, or measure any voltages on the video chassis unless the primary leads of the high voltage transformer have been unsoldered from the supply line, and taped.

A good ground should be connected to the receiver at all times.

Always wear gloves and shatter-proof goggles when handling Kinescope tubes.

Use only one hand when working on the high voltage SPU chassis, and always connect a shorting lead to ground (first), then to the high side of the first high voltage filter capacitor.


** ON EARLY MODELS 1ST SOUND I.F. TRANS. MAY BE ORANGE-RED.
* R.F. COIL COLOR CODE FOR EARLY MODELS.
† SEE SERVICE HINTS IN TEXT.
THESE TWO LEADS ARE REVERSED FOR DIRECT VIEWING AS ON THE TRK-9.
CIRCLES (1 TO 14) ALONG THIS LINE INDICATE PIN CONNECTIONS TO SOCKETS X-13 AND X-15, PLUGS X-12 AND X-14 HAVE CORRESPONDING NUMBERS.
OTHER LEADS LEAVING ALONG THIS LINE ARE A 5-CONDUCTOR KINESCOPE CABLE AND A 2-CONDUCTOR 117 V. A.C. POWER CORD.
WARNING- HIGH VOLTAGE CIRCUITS
RADIO CHASSIS
KINESCOPE HEATER CABLE
W-303133-2

Instructions for Replacing or Orienting Deflecting Yoke

1. Remove Kinescope.

2. Loosen yoke support bracket wing nuts and remove complete yoke and shield assembly.

3. Remove outer shield. Loosen yoke clamp screws to permit removal or orientation of yoke. If it is necessary to orient yoke, pull yoke out so it extends about one inch. Tighten screws just enough to hold yoke but not too tight as it may be necessary to turn it in this extended position. Replace the inner shield and yoke in the yoke mounting brackets.

4. Replace Kinescope and protective glass cover.

5. Move the inner shield and yoke assembly vertically until yoke is gently touching Kinescope bulb. Tighten yoke bracket wing nuts.

6. Rotate yoke carefully with one hand to orient raster or picture.

7. Remove Kinescope.

8. Remove carefully (so as not to disturb yoke adjustment) the inner shield and yoke assembly. Place the latter on a flat surface with the extended yoke end flush to surface. Press inner shield gently down until yoke edge is flush with inner shield edge. Tighten yoke clamp screws evenly by first pulling one up and then the other.

9. Assemble outer shield to inner shield and yoke assembly so bottoms of shields are flush.

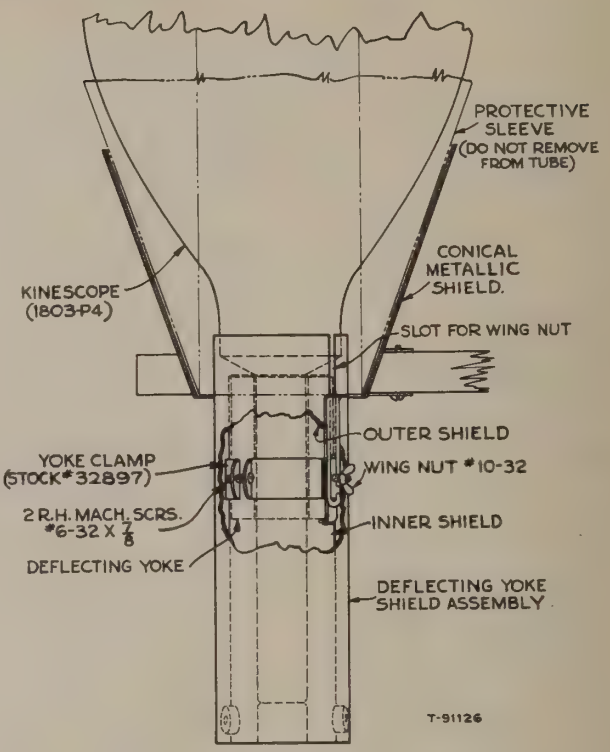
10. Replace complete shield and yoke assembly in the yoke support bracket.

11. Replace Kinescope and tighten protective glass cover.

12. Push gently complete assembly up flush against the Kinescope bulb. Tighten wing nuts.

IMPORTANT: 1. The hole in the conical metallic shield must line up with the hole in the protective sleeve to permit connection of the second anode cable.

2. Do not jar or drop the shields and keep away from the loudspeaker field coil to prevent magnetization.



Assembly Details, Showing Kinescope and Deflecting Yoke Shielding.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

Refer to Model TRK-12 and TRK-9 (60 cycle) Service Data (1939—No. 17) for all Replacement Parts, except as listed below.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	7,500 VOLT TELEVISION POWER UNIT		33023	Capacitor—80-10 mfd., 400 volt, (C118, C119)	
	KK-7D in TRK-12 (50-60 cycle) KK-7E in TRK-9 (50-60 cycle)		34526	High Voltage Power Transformer—105-125 volt, 50-60 cycle (T9)	
			34527	Fuse—0.75 ampere	
12484	Capacitor—0.25 mfd., 350 volts (C120)			TELEVISION CHASSIS ASSEMBLIES	
34331	Capacitor—0.1 mfd., 7,500 volts (C121, C122)			KC-4B in TRK-12 (50-60 cycle) KC-4C in TRK-9 (50-60 cycle)	
34302	Transformer—105-125 volt, 50-60 cycle (T8)		32145	Capacitor—4 mfd., 450 volts (C117)	

RCA Victor

MODEL TRK-90 and MODEL TRK-120

Chassis No. KC-4H, KK-7H, RC-427G, RS-83E; Chassis Nos. KC-4F, KK-7F, RC-427F, RS-83E

AC, Superheterodyne, High-Picture-Definition, Five-Television-Channel, Receiver

and

Eleven-Tube, Three-Band, Electric Tuning, AC, Superheterodyne Broadcast Receiver

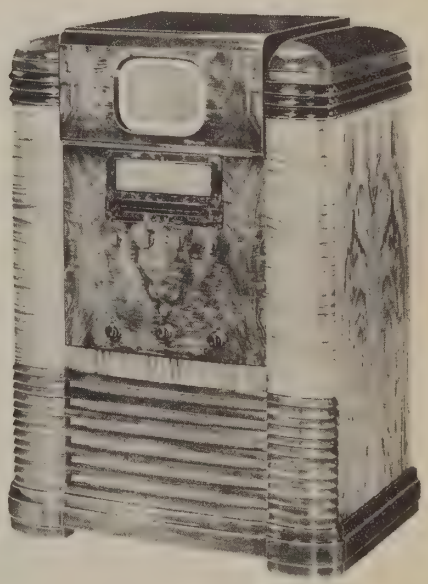
TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

←*Model TRK-120*

Model TRK-90 →



IMPORTANT PRECAUTIONS

A good ground should be connected to the receiver at all times.

Always wear gloves and shatter-proof goggles when handling Kinescope tubes.

Do not eliminate the protection afforded by the interlock switches.

ALWAYS replace the shield can over the 2V3-G high voltage rectifier. The most dangerous portion of the H.V. supply is the plate lead of the 2V3-G tube.

Do not measure any voltages on the video chassis unless the primary leads of the high voltage transformer have been unsoldered from the supply line, and taped.

Use only one hand when working on the video or high voltage SPU chassis, and always connect a shorting lead to ground (first), then to the high side of both high voltage filter capacitors.

Make no voltage measurements on the high voltage (7,300 volts) SPU chassis.

Work on a television receiver should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment.

Trademarks "Kinescope," "Radiotron," "RCA Victor," "Victrola," Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

TELEVISION RECEIVER

General Description

The TRK-120 consists of a console-type, high-picture-definition, mirror-viewing, five channel, Television Receiver and an eleven-tube, three-band broadcast radio receiver enclosed in a handsomely styled modern cabinet. Features of the Television receiver include: Twelve-inch Kinescope; Styrol (humidity-resisting) r-f and i-f transformer forms; black and white pictures; single station selector switch; temperature compensated condensers; iron core i-f and r-f tuning; double safety switch protection; safety-glass viewing shield; extra large viewing mirror for wide angle viewing; automatic brightness control; and automatic volume control.

The TRK-90 is a direct viewing, high-picture-definition console-type, five channel, Television Receiver and an eleven tube, three-band broadcast radio receiver in a deluxe upright modern cabinet. Television features of this receiver are the same as for the TRK-120, except that a nine-inch Kinescope is used.

General Specifications

Model TRK-90				Model TRK-120			
Height	47½ in.;	Depth	24 3/16 in.	Height	40⅝ in.;	Depth	19⅞ in.
Width	31½ in.;	Weight	200 lb.	Width	34⅝ in.;	Weight	198 lb.
Shipping Weight			283 lb.	Shipping Weight			275 lb.

Power Supply Rating ..... 105-125 volts, 60 cycles, 420 watts (Total)
Fuse Rating—T5 and T7 (T7 and T8 in 50 cycle model) ..... 3 amperes
Fuse Rating—T6 (T9 in 50 cycle model) ..... ¾ ampere

Mechanical Specifications

Video Chassis Base Dimensions	17 in. x 16 in	Max. Height	8½ in.
SPU Chassis Base Dimensions	15 in. x 13¼ in.	Max. Height	10 in.

Electrical Specifications

RCA Tube Complement

In KC-4F (TRK-120), and KC-4H (TRK-90) Video Chassis

(1) RCA-6AC7	(5) RCA-6AB7	(9) RCA-6SQ7	(13) RCA-6AB7	(17) RCA-6N7	(21) RCA-6N7	
(2) RCA-6J5	(6) RCA-6AB7	(10) RCA-6AC7	(14) RCA-6H6	(18) RCA-6N7	(22) RCA-6J5	
(3) RCA-6AB7	(7) RCA-6AC7	(11) Kinescope*	(15) RCA-6N7	(19) RCA-6L6	*RCA-1803-P4 (TRK-120)	
(4) RCA-6AB7	(8) RCA-6H6	(12) RCA-6SK7	(16) RCA-6Y6-G	(20) RCA-5V4-G	*RCA-1804-P4 (TRK-90)	

In KK-7F (TRK-120), and KK-7H (TRK-90) Socket Power Units

(23) RCA-5U4-G ..... Low Voltage Rectifier (24) RCA-2V3-G ..... High Voltage Rectifier

Television Channels (Selector Switch Positions)

1	44 to 50 mc.	3	66 to 72 mc.
2	50 to 56 mc.	4	78 to 84 mc.
		5	84 to 90 mc.

Over-all Video Band Width ..... 4 mc.
Scanning ..... Interlaced, 441 Line
Horizontal (Line) Scanning Frequency (Sawtooth Wave) ..... 13,230 cps
Vertical (Field) Scanning Frequency (Sawtooth Wave) ..... 60 cps
Frame Frequency (Picture Repetition Rate) ..... 30 cps

Picture Size (Approx. Mask Dimensions)

TRK-90 ..... 5½ x 7¼ in. TRK-120 ..... 7⅜ x 9¾ in.

Precautions in Handling Kinescopes

The Kinescope bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure. For these reasons, Kinescopes must be handled with more care than ordinary receiving tubes.

The large end of the Kinescope bulb — particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure at any time. If the tube sticks, or fails to slip into its socket or deflecting yoke smoothly, investigate and remove the cause of trouble. Do not force the tube.

All RCA Kinescopes are shipped in special cartons and should always be left in the cartons until ready for installation in the receiver. Keep the carton for future use.

The RCA-1803-P4 (12-inch) Kinescope is equipped with a protective lid and shield. Do not at any time remove the close-fitting cone-shaped section of the protective shield from the Kinescope. This section should be installed with the tube in the cabinet and is designed to protect the user while handling the glass bulb.

CAUTION: Do not open the shipping carton, install, remove, or handle the Kinescope in any manner, unless shatter-proof goggles and heavy gloves are worn. People not so equipped should be kept away while handling Kinescopes. Keep Kinescope away from the body while handling.

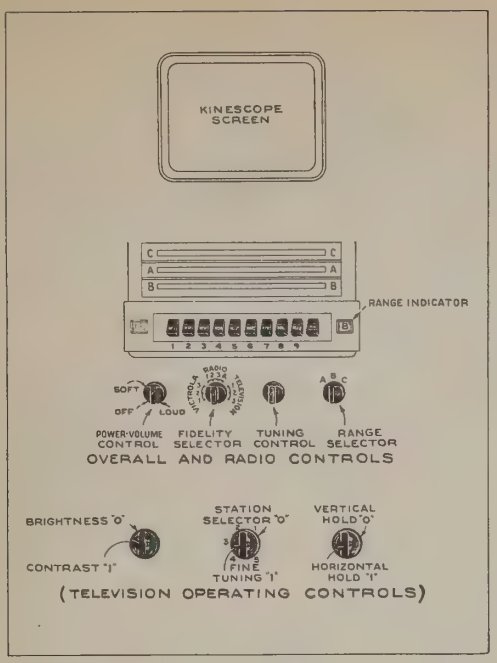


Figure 1—Operating Controls, TRK-90

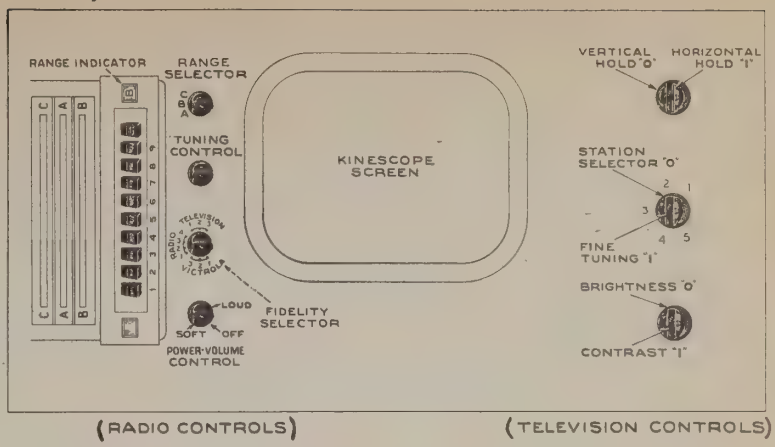


Figure 2—Operating Controls, TRK-120

The "Power-Volume" control on the radio receiver turns on the power for the complete receiver. The "Victrola, Radio, Television" control selects the type of operation desired. There are three Victrola fidelity positions, four radio fidelity positions and three Television sound fidelity positions on this switch. The furthermost clockwise position being the highest fidelity position for Television sound.

Television Operation:

Station Selector and Fine Tuning.—The outer ring **"O"** section of the central dual control knob on the Television panel selects the station from which it is desired to receive television transmissions.

Five television channels are covered as follows:

(1) 44 to 50 mc.
(2) 50 to 56 mc.
(3) 66 to 72 mc.
(4) 78 to 84 mc.
(5) 84 to 90 mc.

Set the station selector to the number corresponding to the frequency of the station from which it is desired to receive Television broadcasts.

The inner section **"I"** of this knob is used for fine tuning and may eliminate moving ripples or distortion if due to interfering radio signals. A slight downward pressure must be exerted while turning the knob on the TRK-120, and an inward pressure on the TRK-90.

Before the Television portion of the receiver is turned "ON" it is advisable to turn the Brightness and Contrast controls completely counter-clockwise to reduce the illumination of the spot which appears on the Kinescope before the sweep circuits have started functioning.

Contrast and Brightness Controls.—The inner **"I"** section of the "Contrast" - "Brightness" controls is the "Contrast" control and varies the black and white tones of the picture being received. Too much contrast gives blurred details and a lack of half-tones, while too little contrast makes it all half-tones or grays. Turning clockwise increases contrast from grays, to black and white. See Operating Instructions for this receiver.

The outer ring **"O"** is the Brightness Control and affects the average illumination of the picture. Turning clockwise increases the brightness. See Operating Instructions for this receiver.

An approximate adjustment for proper contrast is to turn the "Contrast" control fully counter-clockwise, then turn the "Brightness" control until the screen is slightly illuminated. Then reduce the Brightness control just sufficient to make the screen dark, then bring up the Contrast Control until the picture appears. A slight further adjustment of the Brightness or Contrast control may be necessary in some cases. A slight readjustment of the contrast control may aid synchronization of the picture.

Hold Controls.—The dual knobs on the Television panel marked "Horizontal" and "Vertical" Hold, control the picture stability. The inner section designated by a **"I"** is the Horizontal Hold Control and when being set should be turned slowly to the point at which the picture "locks in" horizontally. See Operating Instructions for this receiver.

The outer ring section designated by **"O"** is the vertical Hold Control and when being set should be turned to the point where the picture "locks in" vertically.

These two controls on this dual knob should not ordinarily require readjustment after good picture reception has once been obtained. An occasional resetting may be necessary due to changing to a different station, and to the gradual aging of the tubes.

SERVICE DATA

Kinescope Installation (TRK-90).

1. Remove back cover of cabinet.
2. Remove the two screws which secure the wooden block, on which the yoke is mounted, to the upper shelf, and drop this block and yoke away from the shelf.
3. Loosen the thumb screw in the center of the slotted block of wood on the top shelf, pull this block of wood towards the rear of the cabinet and turn it so that the "V" slot on the front end of the block is to your right.
4. Wearing gloves and goggles, carefully slide the Kinescope on the "V" in the block, and turn both the block and the Kinescope so that the Kinescope faces the viewing window. Slide the Kinescope up to the mask in the window and fasten loosely in place by sliding the "V" block up to the bottom of the Kinescope face, and fastening it with the thumb screw.
5. Place the yoke and the wooden block on which it is mounted, on the Kinescope neck, rotate the block 90° from its original mounting position in order to have it clear the top of the cabinet and slide it into position on the Kinescope neck. DO NOT FORCE YOKE. In some cases where the yoke lead is too short it may be necessary to loosen the "V" block and swing the Kinescope neck to the left in order to be able to place the yoke on the Kinescope neck without forcing.
6. Fit the upper part of the wooden yoke mounting block into the slot on the underside of the cabinet top and fasten the lower end of the block securely by means of the two screws. The Kinescope should be mounted loosely in place, so that the yoke is not forced on the Kinescope neck at any time.

7. Loosen the wing nuts on the yoke mounting bracket, and move the yoke forward on the neck of the Kinescope so that it pushes the Kinescope against the mask. Tighten the wing nuts to hold the Kinescope and yoke securely in this position.

8. It may be necessary to rotate the Kinescope, within the limits allowed by the high voltage second anode lead, with respect to the mask in order to obtain proper masking of the edges on the Kinescope screen. Before rotating the Kinescope, the screws holding the yoke mounting block should be loosened, so that the Kinescope neck will not be forced.

9. Move the "V" block forward so that it holds the bottom of the Kinescope in place. Tighten the thumb screw.

10. Place the second anode lead on the second anode cap at the side of the Kinescope.

11. After the receiver is operating, and if the picture is not squared with the mask, using a screw driver loosen the clamping screws on the band around the yoke and rotate the yoke until the picture is squared with the mask, then tighten these clamping screws securely.

CAUTION: When removing the back cover of the cabinet, after the screws have been removed do not allow the cover to slide down on the neck of the Kinescope, or the neck of the Kinescope may be snapped off.

Kinescope Installation (TRK-120).—Refer to figure 4.

1. Remove back cabinet cover.

2. Remove the top safety glass cover by removing the three wing nuts "E" at the two front corners and right rear corner of the cover and loosening the wing nut "E" at the left rear corner of the cover.

3. Lift the cover straight upwards, taking care not to scratch the cabinet finish with the protruding screws or the cover itself.

4. Loosen the two wing nuts "F" on the yoke holding frame, and allow the yoke to drop down as far as possible.

5. Using gloves and goggles, open the Kinescope shipping carton and remove the top cover on the Kinescope.

6. Remove the Kinescope from the shipping carton (do not remove the close fitting cardboard shield from the Kinescope), and insert the Kinescope into the cabinet, guiding the neck of the Kinescope into the yoke. Do not force the neck of the Kinescope into the yoke, or the tube may break. Let the Kinescope down slowly so that it finally rests on the yoke.

7. Rotate the Kinescope and cardboard container (but not the yoke), so that the second anode cap at the side of the tube is towards the front of the cabinet.

8. Place the white rubber mask on the face of the Kinescope, with the ribs on the mask facing upwards toward the mirror. Line up the mask so that it masks the edges on the Kinescope face. Then, if necessary, lift the Kinescope and rotate it so the mask is approximately squared up with the cover opening. The second anode cap should be kept towards the front of the cabinet.

9. Replace the safety glass cover and wing nuts. Tighten wing nuts to hold the cover securely.

10. Loosen the wing nuts "F" on the yoke mounting bracket and push the two metal brackets, on which the bottom of the yoke rests, upward, until the rubber mask rests against the top cover. If the mask and the cover opening do not line up, rotate the cone-shaped Kinescope shield until they do. Tighten the wing nuts to hold the yoke and tube in this position. In some cases it may be necessary to loosen the four screws holding the yoke support to the wooden frame and shift the yoke support to make the mask and Kinescope line up symmetrically with the cover opening.

11. Place the second anode lead on the second anode cap at the side of the Kinescope.

12. After the receiver is operating, and if the picture is not squared up with the cover opening, the two screws "H" on the band around the yoke should be loosened, and the yoke rotated to square up the picture, then these screws should be tightened with a screw driver.

Focusing Control.—This is a screw driver adjustment located on the right side of the cabinet near the base.

Adjustments.—There are a series of screw driver slot adjustments at the rear of the TRK-120 (at the side of the TRK-90), used to obtain the proper picture size, centering, and vertical distribution. These adjustments are explained fully in the receiver operating instructions, and also in the booklet: "Practical Television by RCA."

When the receiver is moved from one location to another some readjustment of these controls may be necessary.

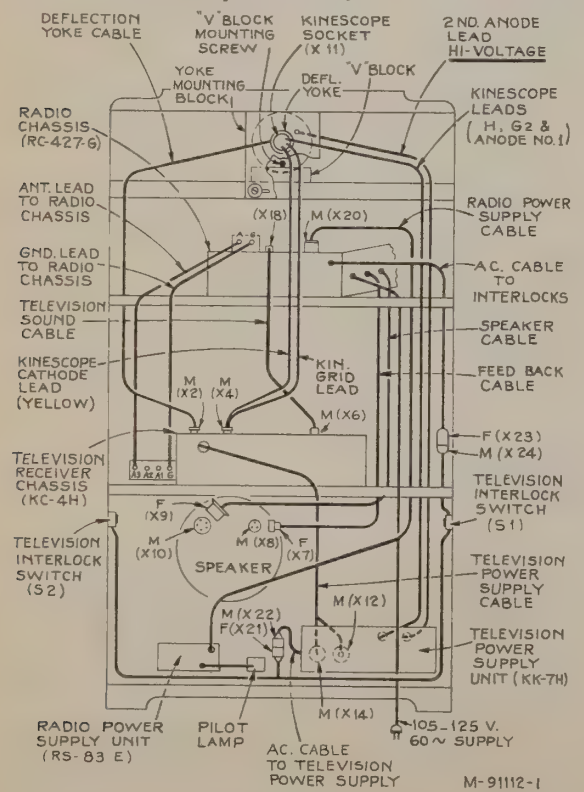


Figure 3—Cabinet Wiring—Model TRK-90

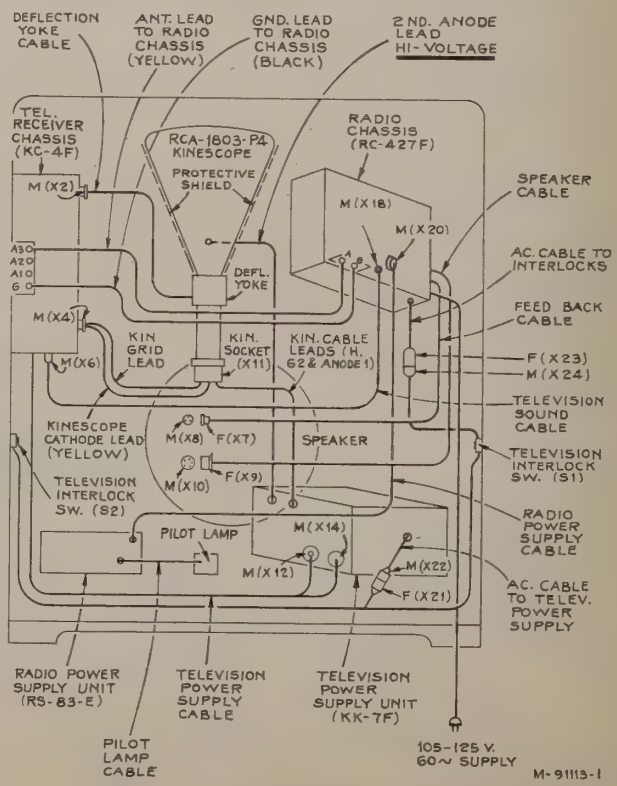


Figure 3a—Cabinet Wiring—Model TRK-120

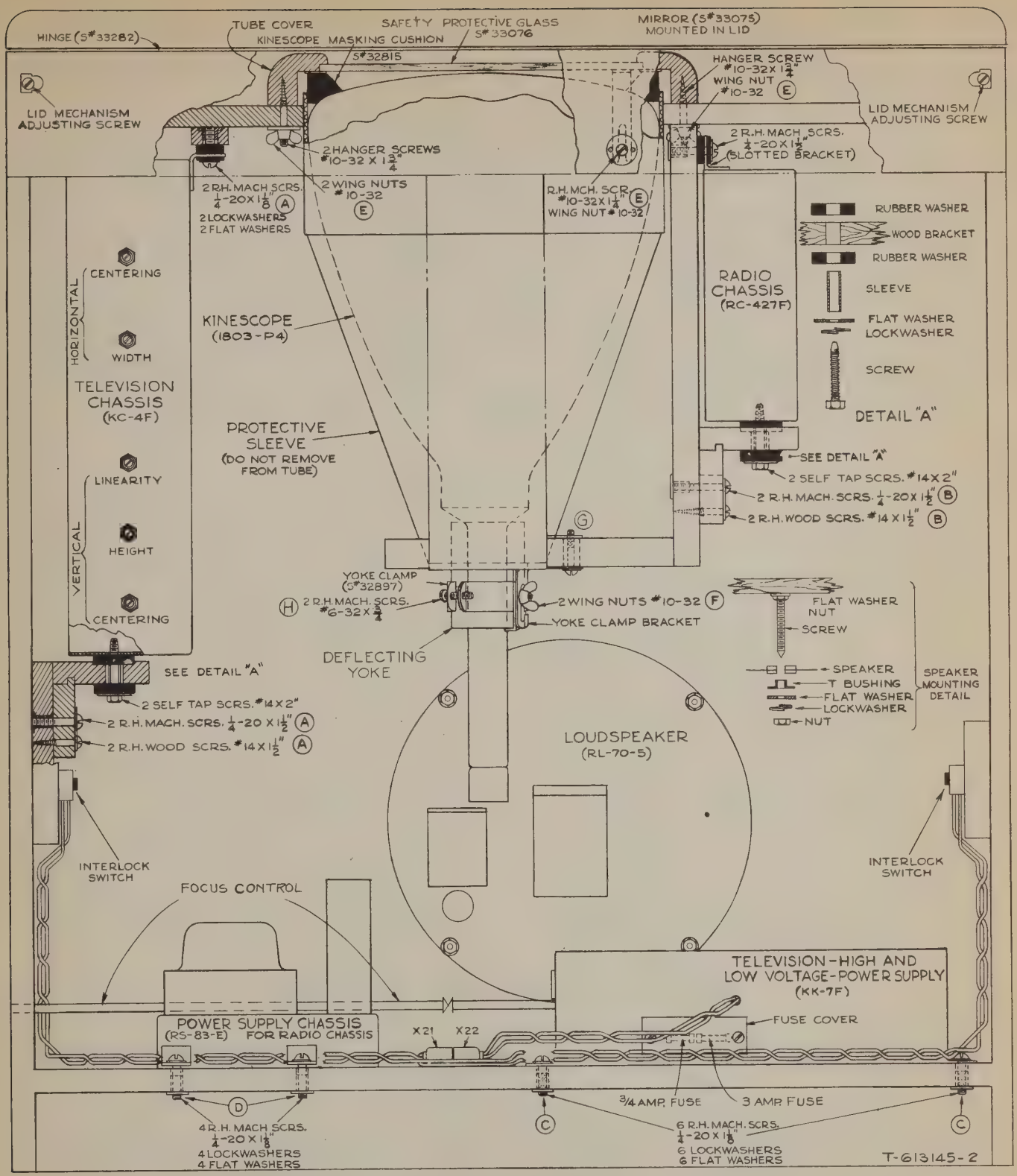
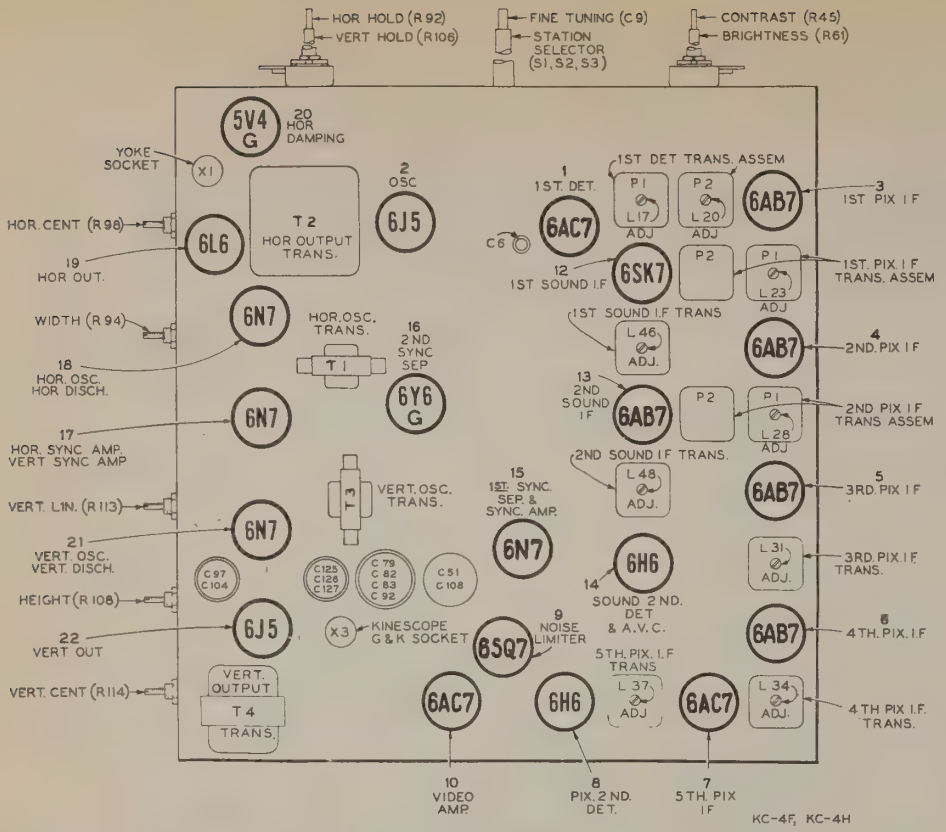
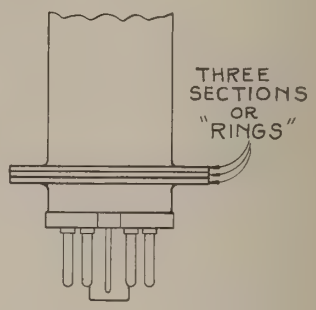


Figure 4—TRK-120 Assembly



At Left—Figure 5
Top View Video Chassis



(Above) Figure 6
Recommended Type 6L6 Identification

Video Chassis KC-4F, KC-4H

When it is desired to measure any voltages on this chassis, the primary leads of the high voltage transformer T6 should be disconnected and taped together.

When any changes have to be made in the Video chassis, the lead and part locations should be replaced as closely as possible to the original positions.

Because of the special equipment and procedure necessary for the proper alignment of these receivers, the alignment will be covered in a supplementary booklet.

Refer to the booklet: **Practical Television by RCA,** for detailed explanations of circuit operation in a Television receiver.

Service Hints:

1. Poor Horizontal Distribution of the picture elements may be due to a 6L6 tube. RCA-6L6 tubes of known recent manufacture are the only tubes recommended for the Horizontal sweep output circuit. By careful scrutiny, these tubes can be identified by the three "rings" or sections welded together at the base ring of the tube, as shown in Figure 6. If any other 6L6 tube is used in this position it will break down in a very short time.

2. If the picture "tears out" when the receiver is jarred it may be due to microphonic 6AB7, 6AC7 or 6J5 tubes.

3. The 6J5 oscillator tube should be removed without rocking it in its socket to loosen it, as the rocking motion may cause the 80.5 mmf capacitor to break off.

4. The coils in oscillator circuit should not be touched or moved or the alignment of the receiver will be disturbed.

5. The insulator on the filter capacitors may become dirty and break down to short out the high voltage.

6. The Video coupling capacitors C50, 53, 59 should be kept clear of chassis.

7. A gassy 2V3-G tube may cause resistor R-137 to burn. Replace 2V3-G tube, and resistor, if necessary.

8. Changing the position of the oscillator shield plate will disturb the alignment.

Socket Power Units KK-7F, KK-7H

The following precautions should be observed when any work is being done on the SPU:

1. Remove power supply cord from the power supply socket.

2. No attempt should ever be made to measure the high (7,500 volts) voltage because of the difficulties and dangers involved. Servicing should be done with an ohm meter.

3. If, at any time it becomes necessary to service the SPU, the suspected parts should be replaced by parts known to be in good operating condition.

4. Use only one hand at a time. It is advisable to keep the other hand in one's pocket.

5. Connect a shorting lead between ground (first) and the high voltage side of C-113 and C-114.

6 Whenever working with the oil-filled capacitors, keep a constant short across the capacitor, as these capacitors do not completely lose their charge after being discharged a single or several subsequent times.

7. Only one person at a time should work on the unit to prevent any misunderstanding which may result in an accident.

Antenna

The finest television receiver built may be said to be only as good as the antenna design and installation. It is therefore important to use a correctly designed antenna, and use care in its installation.

The RCA Double Dipole Antenna, Stock No. 9871, is recommended for use with these receivers. Both this antenna and the "V" antenna described below are especially designed for a sufficient broad frequency response to cover the contemplated television spectrum with good efficiency and are therefore superior to a single Dipole type antenna.

When greater signal pickup, or where a shielding effect from noise sources or image reflections are desired, a reflector assembly, Stock No. 9872, may be added to the Stock No. 9871 Antenna to obtain an improved signal-to-noise ratio.

The RCA Double "V" Wire Type Television Antenna is an alternative type of antenna designed for television sight and sound reception. Two points of support are necessary. It serves adequately in suburban areas, but may not be sufficiently flexible in congested city areas where bad reflections and interference are encountered.

Antenna Installation.

In most cases, the antenna should not be installed permanently on the apartment or residence roof until the quality of the picture reception has been observed on a Television receiver. A temporary transmission line can be run between receiver and the antenna allowing sufficient slack to permit moving the antenna. Then, with a telephone system connecting an observer at the receiver and an assistant on the roof to find an antenna location, the antenna can be positioned to give the most satisfactory results on the received signal. A shift of only a few feet in antenna position or direction may effect a tremendous difference in picture reception.

Whenever possible, the antenna location should be chosen or erected so the antenna is not only broadside to the transmitter but removed as far as possible from highways, hospitals and doctors' offices and similar sources of interference. Auto ignition and diathermy apparatus may cause noise interference spoiling the picture.

In mounting any antenna, care must be taken to keep the antenna rods or pickup wires proper at least ¼ wave length (at least 6 feet) away from other antennas, metal roofs and gutters or metal objects. Under certain extremely unusual conditions, it may be possible to rotate or position the antenna so it receives the cleanest picture over a reflected path. If such is the case, the antenna should be so positioned. However, such a position may give variable results as the nature of reflecting surfaces may vary with weather conditions, as a wet surface has been known to have different reflecting characteristics than a dry surface.

In short, a television receiving antenna and its installation must conform to much higher standards than an antenna for reception of International Short Wave and Standard Broadcast signals because:

(1) Intervening obstacles have a pronounced shielding effect on the ultra-high frequency waves producing low intensity signals. Severe trouble with multi-path transmissions may be experienced, especially in congested city areas.

(2) The picture signal is comprised of a very wide band or range of frequencies, all of which must be received with good efficiency.

(3) It must be continually remembered that the discernment for the eye is much more critical than that of the ear.

For further information on antennas and antenna installation see RCA Booklet entitled: **"Practical Television by RCA,"** and also the specific instructions accompanying the RCA Television Antenna.

Transmission Line

RCA Victor has made available two types of exterior transmission lines. One is a special low loss weather-proofed line having the correct surge impedance to match the RCA Victor Television antennas and the RCA Victor Television receivers. It is carried as Stock No. 9882 in 1,000-foot rolls. The second type is a standard weather-proofed line, also having the correct surge impedance for proper antenna and receiver matching. It is carried as Stock No. 12430 in 90-foot rolls, Stock No. 12429 in 45-foot rolls and is available in 1,000-foot spools as Stock No. 9881. Use of improper lines may result in excessive loss or may lead to line reflections, resulting in multiple images or "ghosts," thus marring the reception.

For transmission line runs up to 200 feet, and where the signal strength on the antenna is relatively high, the Stock No. 12430, or Stock No. 12429 transmission line may be used. For all other applications the Stock No. 9882 transmission line is recommended.

In some areas of very high signal intensity, a lead covered transmission line may be advantageous.

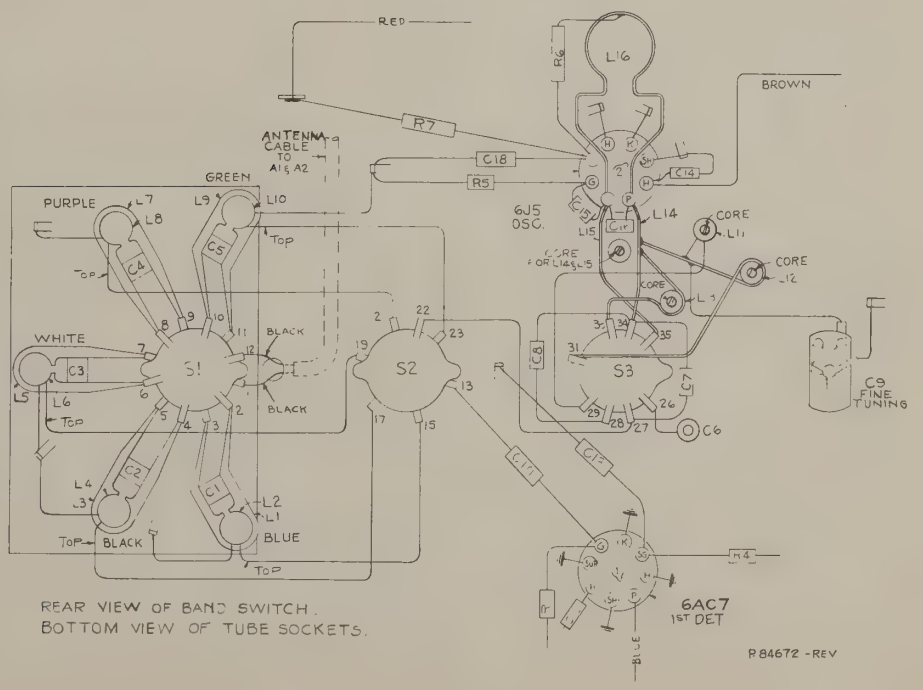


Figure 7—R. F. Unit Wiring

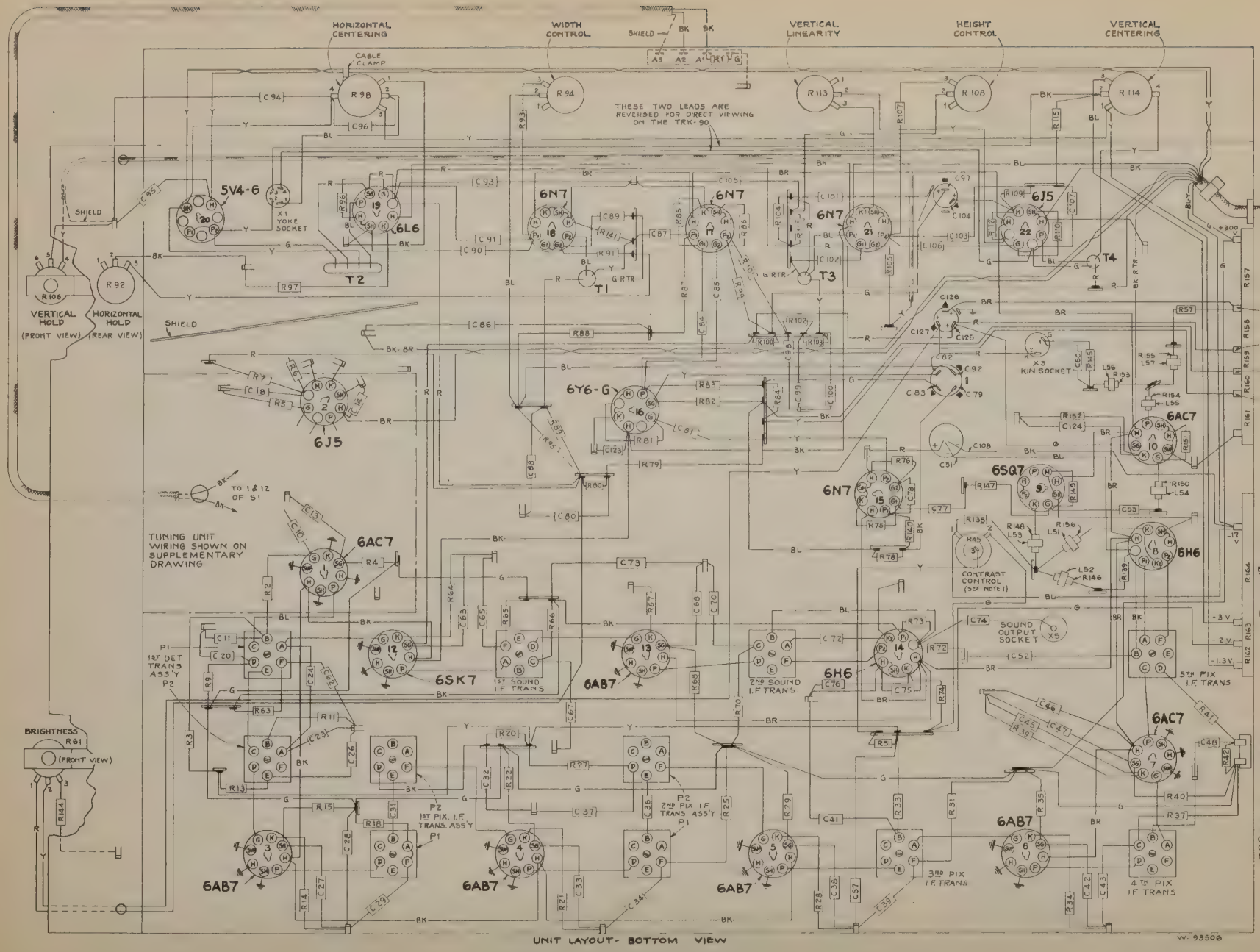


Figure 10—Video Chassis Wiring

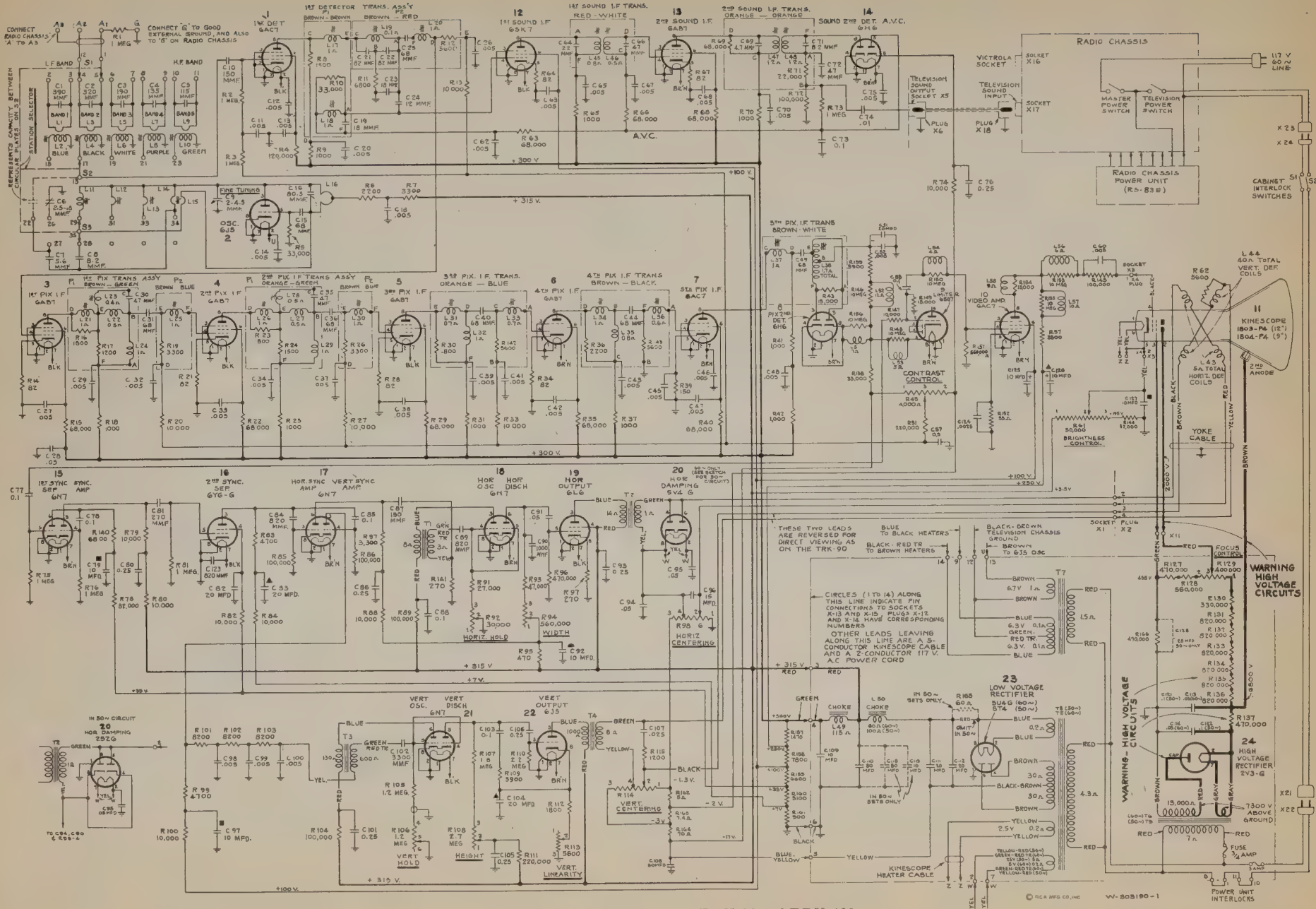
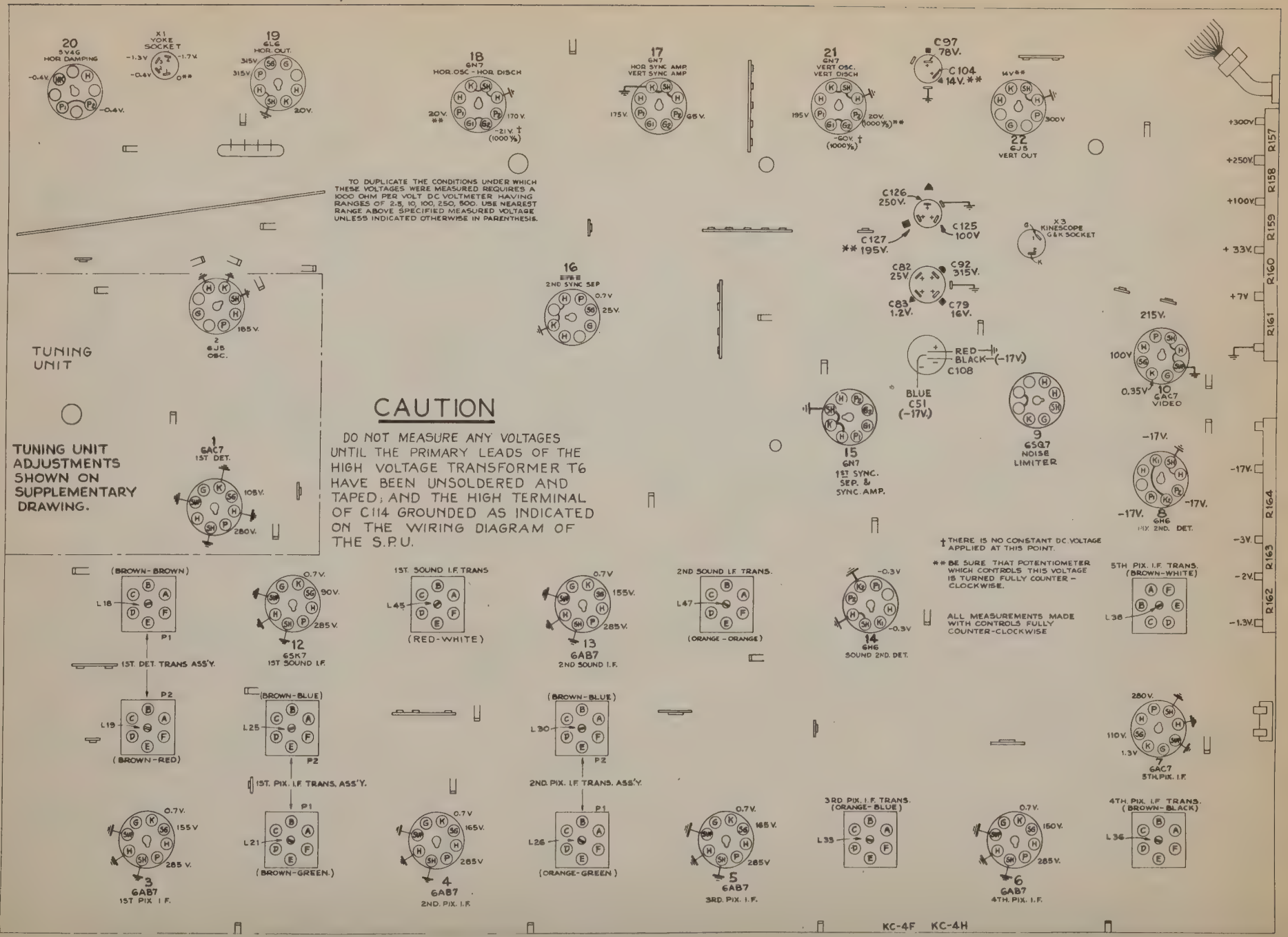


Figure 9—Schematic Diagram, TRK-90 and TRK-120



Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and all controls and adjustments full counter-clockwise. Values should hold within ±20% with 117-volt a-c supply.

Figure 8—Voltage Diagram

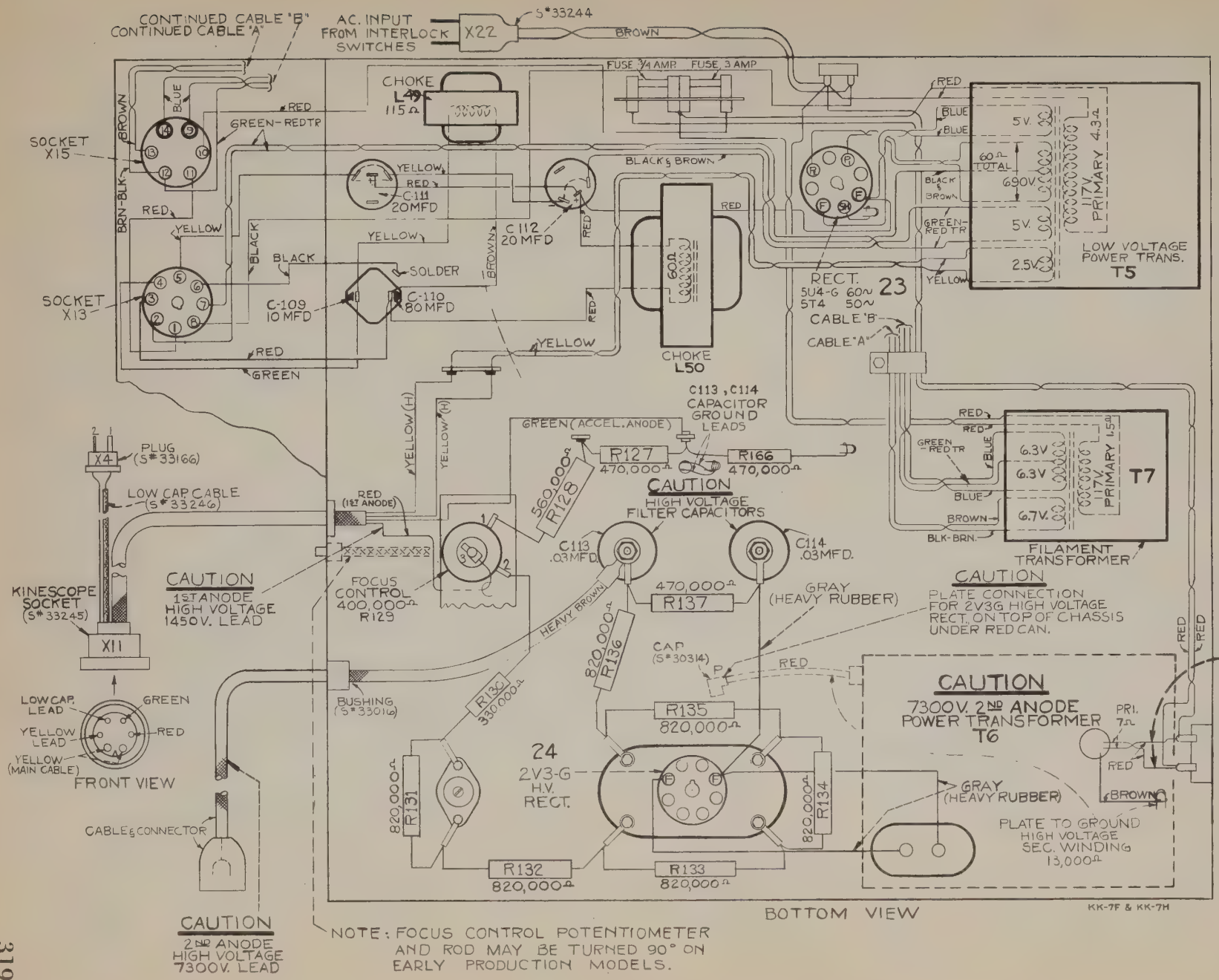


Figure 11—SPU Wiring (60 Cycle Models)

Radio Receiver Chassis No. RC-427F, RC-427G and Socket Power Unit No. RS-83E

Eleven-Tube, Three-Band, Electric-Tuning, A-C, Superheterodyne Receiver

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast ("A" band)..... 540-1,720 kc
Medium Wave ("B" band)..... 2.3-7.0 mc
Short Wave ("C" band)..... 7.0-22 mc
Intermediate Frequency..... 455 kc

TUBE COMPLEMENT

(1) RCA-6K7..... R-F Amplifier
(2) RCA-6A8..... 1st Detector
(3) RCA-6J7..... Oscillator
(4) RCA-6K7..... 1st I-F Amplifier
(5) RCA-6K7..... 2nd I-F Amplifier
(6) RCA-6R7..... 2nd—Det., A.F., A.V.C., and Muting
(7) RCA-6J5..... 2nd A-F Amplifier
(8) RCA-6J5..... Phase Inverter
(9) RCA-6F6..... Power Output
(10) RCA-6F6..... Power Output
In RS-83E SPU
(11) RCA-5U4G..... Full-Wave Rectifier

Dial Lamps..... { Two Mazda No. 44, 6.3 volts, .25 amp.
{ One Mazda No. 47, 6.3 volts, .15 amp.
(The Mazda No. 47 is the electric tuning set-up lamp, located at center of dial.)

Power Supply Rating..... 105-125 volts, 60 cycles, 120 watts

POWER OUTPUT

Undistorted..... 10 watts
Maximum..... 12 watts

LOUDSPEAKER (RL-70F-5)

Type..... 12-inch electrodynamic
Voice-Coil Impedance..... 2.2 ohms at 400 cycles

Mechanical Specifications

RC-427 CHASSIS BASE DIMENSIONS

Height..... 3 inches
Width..... 15½ inches
Depth..... 8½ inches
Overall Chassis Height..... 8½ inches
Tuning Drive Ratio..... 20 to 1

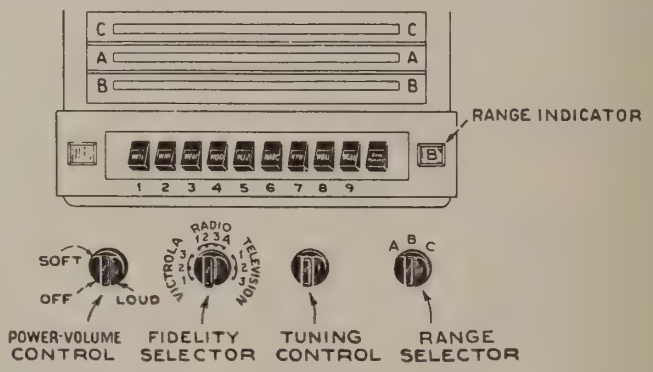
General Description

Radio receiver chassis No. RC-427 is used in RCA Victor Television Console Models TRK-90 and TRK-120.

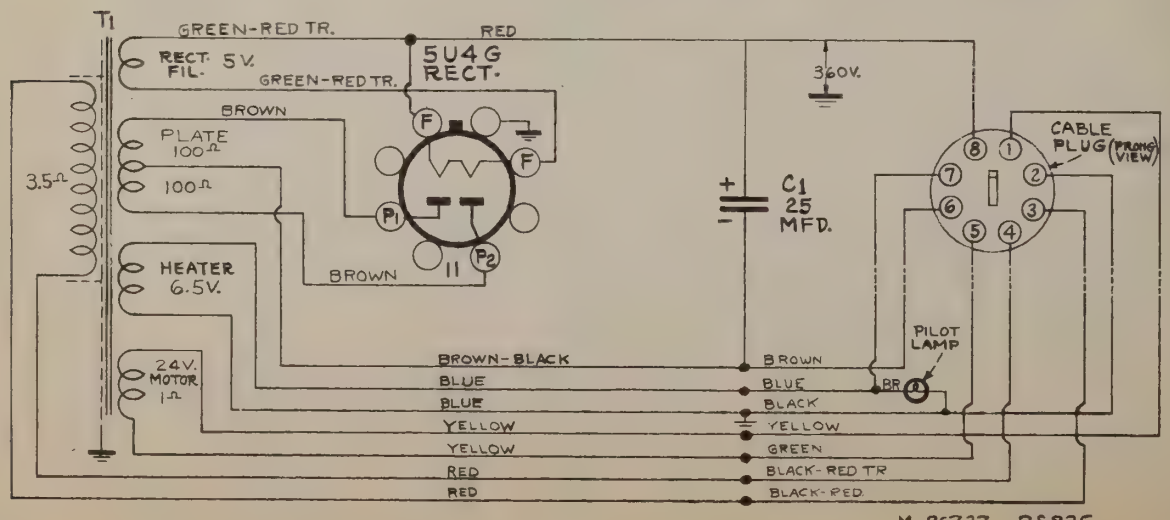
The audio output of the television chassis is connected to the audio input of the radio chassis by means of jack X-17 and section S7 of the fidelity switch. The functions of this switch are tabulated on the following page.

A separate plug-in power unit, RS-83E, is used to supply heater and plate voltages to the radio chassis. Service data and diagram for this power unit are shown below.

At Right—Location of Controls (Radio)



SPU Schematic Diagram, RS-83E



Electric Tuning Mechanism

When a station button is pushed in, it completes the 24-volt circuit through the corresponding station-setting contact and one-half of the brass selector disc, which is connected to one side of the motor field coil. This energizes the motor, and the rotor is pulled forward, engaging with the gear train that drives the tuning condenser and selector disc. The condenser and disc rotate until the insulation line comes under the particular station-setting contact, and the motor circuit is broken.

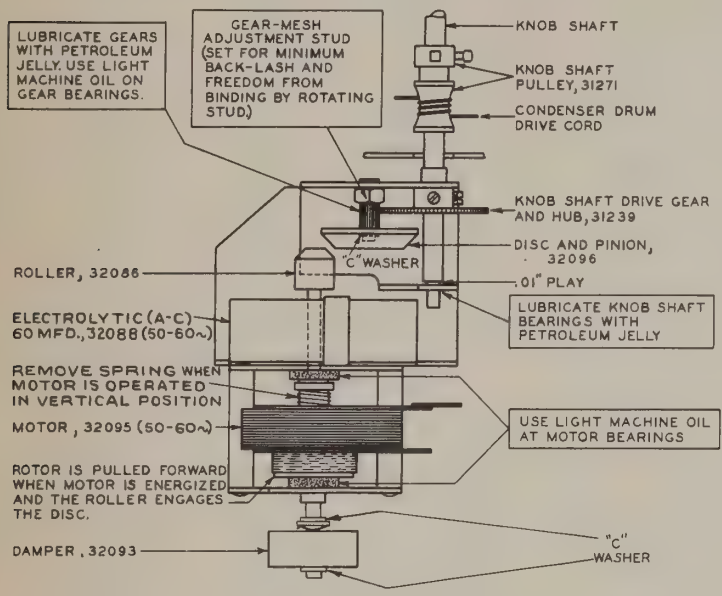
When the electric tuning mechanism is in action, the motor-supply voltage is fed into a diode rectifier circuit which applies a high bias to the first-audio amplifier. This prevents audio amplification and makes the set quiet or "mute" while the mechanism is operating.

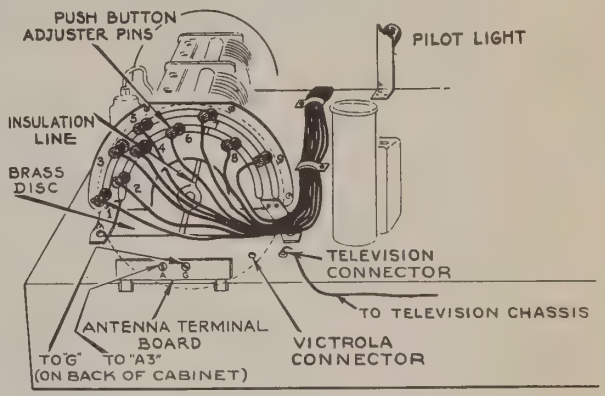
The brass selector disc is fastened to the rear shaft of the tuning condenser by means of two set-screws. When the condenser is at maximum (plates fully meshed) the insulation line should be horizontal, with the operating-end at the left (viewed from rear). The brass is beveled at this end.

The selector disc should be set so that the contact-tip plungers in the station-setting contacts project not more than 1/16-in. from the body of the contacts.

LUBRICATION

Motor bearings and **gear bearings;** use light machine oil.
Gear faces; use "Pure Oil No. 611" or petroleum jelly.
Dial-indicator pulleys and **rails;** use "Castordag" or petroleum jelly.
Selector disc; apply ***thin*** film of petroleum jelly.


LUBRICATE GEARS WITH PETROLEUM JELLY. USE LIGHT MACHINE OIL ON GEAR BEARINGS.
GEAR-MESH ADJUSTMENT STUD (SET FOR MINIMUM BACK-LASH AND FREEDOM FROM BINDING BY ROTATING STUD.)
KNOB SHAFT
KNOB SHAFT PULLEY, 31271
CONDENSER DRUM DRIVE CORD
KNOB SHAFT DRIVE GEAR AND HUB, 31239
DISC AND PINION, 32096
.01" PLAY
"C" WASHER
ROLLER, 32086
LUBRICATE KNOB SHAFT BEARINGS WITH PETROLEUM JELLY
ELECTROLYTIC (A-C) 60 MFD., 32088 (50-60~)
REMOVE SPRING WHEN MOTOR IS OPERATED IN VERTICAL POSITION
MOTOR, 32095 (50-60~)
USE LIGHT MACHINE OIL AT MOTOR BEARINGS
ROTOR IS PULLED FORWARD WHEN MOTOR IS ENERGIZED AND THE ROLLER ENGAGES THE DISC.
DAMPER, 32093
"C" WASHER

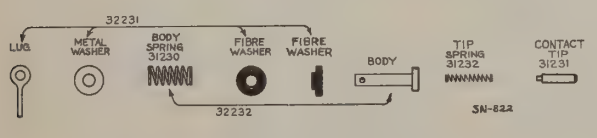


Station Button	Color of Lead To Station-Setting Contact	Station Button	Color of Lead To Station-Setting Contact
No. 1	Yellow-green	No. 6	Red
No. 2	Black	No. 7	Red-black
No. 3	Brown	No. 8	Brown-black
No. 4	Blue	No. 9	Red-yellow
No. 5	Green		

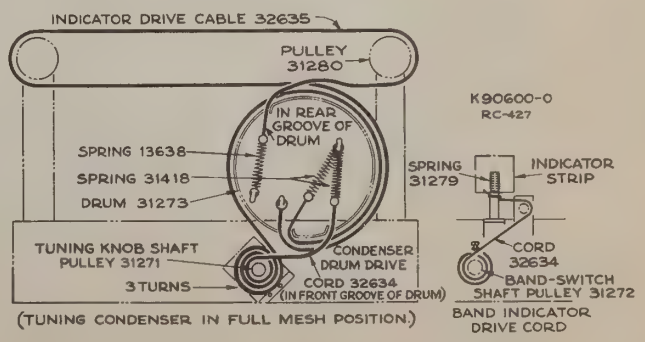
Adjustments for Electric Tuning

With power turned off, disconnect the antenna transmission line and ground connection, turn fidelity control to radio (3rd radio position—6th position from full counter-clockwise). Remove the back from the cabinet and reconnect the antenna transmission line and ground connection. The two interlock switches on the side panels should not be touched and care should be taken not to press on them when making the push-button set-up. Then turn on power, set range selector to "A," allow a few moments warm-up period and proceed as follows:

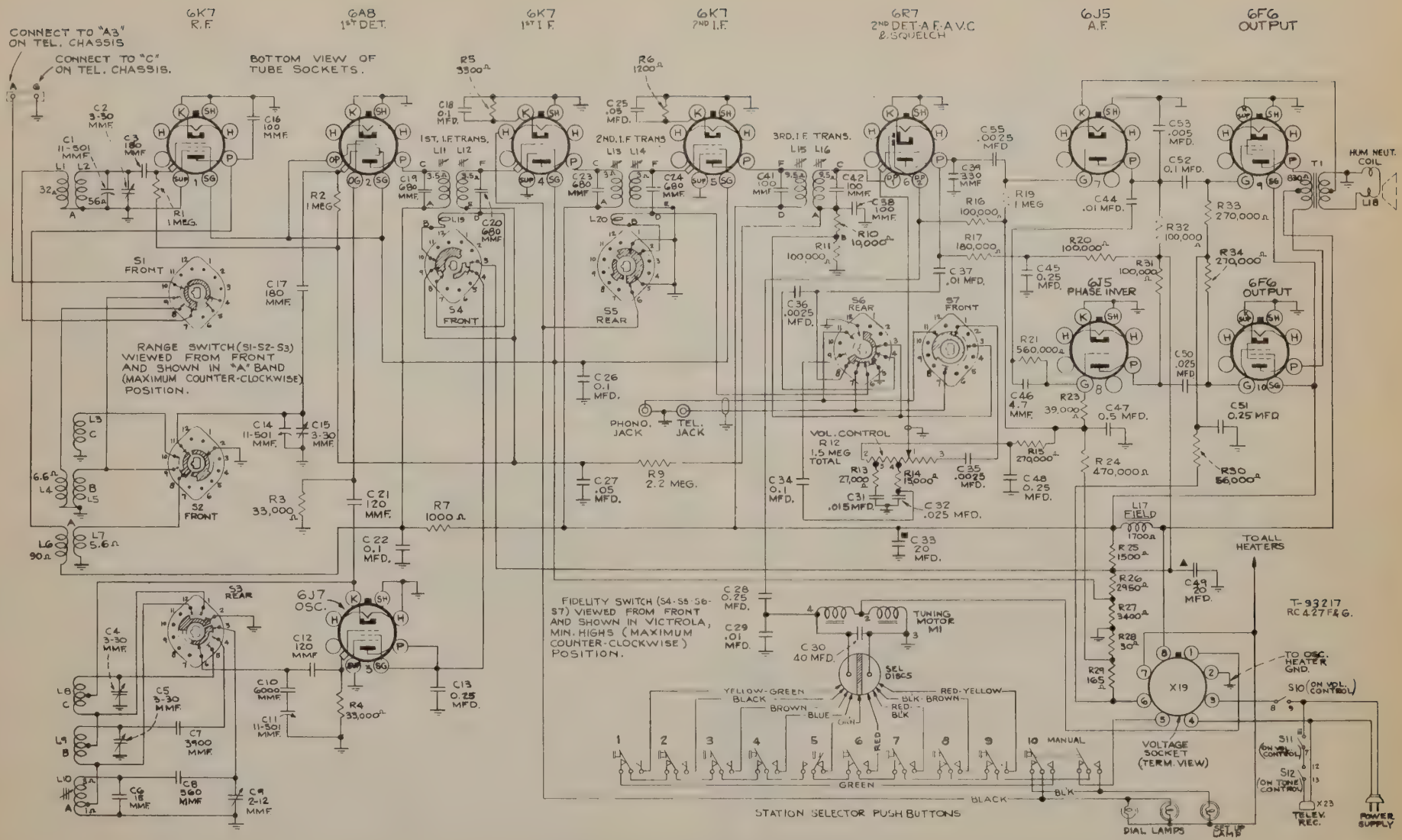
1. Make a list of the desired nine stations, arranged in order from low to high frequencies.
2. Turn on power-volume control, turn range selector to "A" band, and allow a few minutes for warming up.
3. Press down the "dial-tuning" (right-hand) button.
4. Manually tune in the first station on the list.
5. Hold down the "dial-tuning" button and press down station button No. 1 (left-hand). Both buttons will stay down. Move station adjuster contact pin No. 1 to the insulating line on the disc at rear of gang. When the pin is correctly centered on the insulating line, the central dial lamp will go out completely.
6. Press down any other button in order to release the dial-tuning button and station button No. 1. Tune to some other section on the dial, and then press down station button No. 1 again; the electric tuning mechanism will function to tune in the first station, and the central dial lamp will stay on.
7. Repeat this process for the remaining stations.



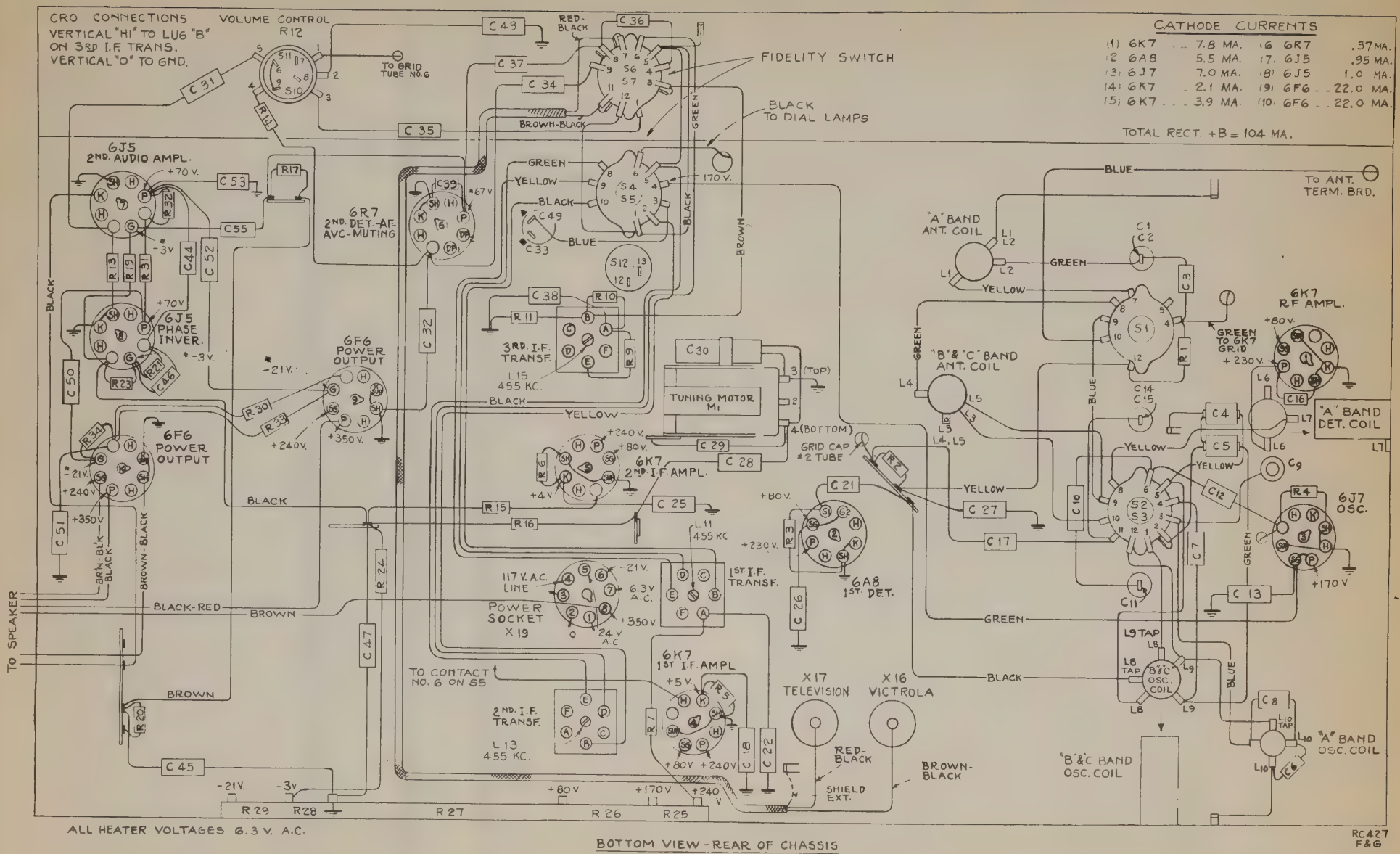
Components of Station Setting Contact



At Right—Dial Mechanism



Schematic Circuit Diagram, Radio Chassis



R-F Wiring Diagram and Socket Voltages (Radio Chassis)

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point, volume control at minimum. Values should hold within approximately ±20% with 117-volt a-c supply.

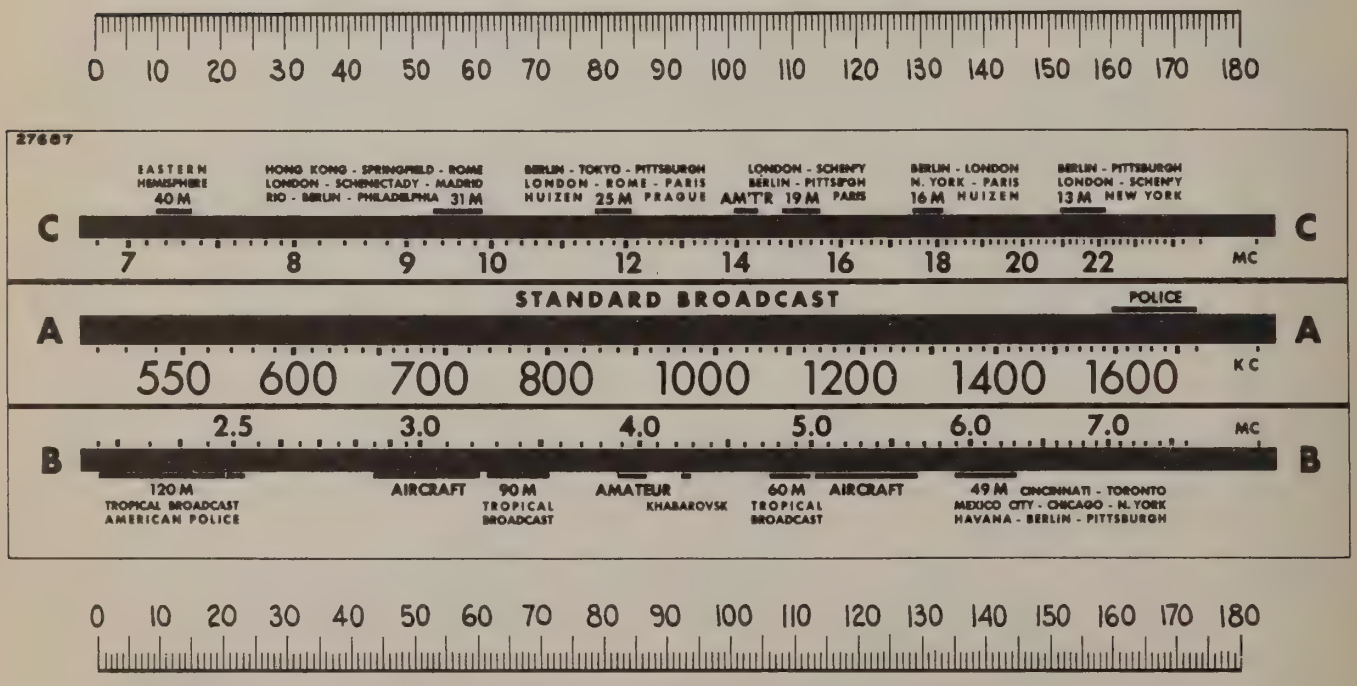
***NOTE:** Values with star (*) are operating voltages in circuits with high series-resistance, and when measured will read lower depending on the voltmeter loading.

Fidelity Switch (S4, S5, S6, S7)

Switch Position	For	I-F Amp.	Audio Amp.	110-V. Supply for Tele. Chassis *	Osc. +B Supply	Dial Lamps **
No. 1 (Counter-clockwise)	Victrola	—	Min. Highs	Off	Off	On
No. 2	Victrola	—	Max. Highs Reduced Lows	Off	Off	On
No. 3	Victrola	—	Full Range	Off	Off	On
No. 1	Radio	Sharp	Min. Highs Max. Lows	Off	On	On
No. 2	Radio	Sharp	Max. Highs Reduced Lows	Off	On	On
No. 3	Radio	Sharp	Max. Highs Full Lows	Off	On	On
No. 4	Radio	Broad	Full Range	Off	On	On
No. 1	Television	—	Min. Highs	On	Off	Off
No. 2	Television	—	Med. Highs Reduced Lows	On	Off	Off
No. 3	Television	—	Full Range	On	Off	Off

* Controlled by switch (S12) on rear of fidelity switch.
** The 1st-I.F. heater is opened on television positions 1, 2 and 3.

Calibration Scale


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
27687
EASTERN HEMISPHERE 40 M
HONG KONG - SPRINGFIELD - ROME
LONDON - SCHENECTADY - MADRID
RIO - BERLIN - PHILADELPHIA 31 M
BERLIN - TOKYO - PITTSBURGH
LONDON - ROME - PARIS
HUIZEN 25 M PRAGUE
LONDON - SCHENY
BERLIN - PITTSBGH
AM'TR 19 M PARIS
BERLIN - LONDON
N. YORK - PARIS
16 M HUIZEN
BERLIN - PITTSBURGH
LONDON - SCHENY
13 M NEW YORK
C
7 8 9 10 12 14 16 18 20 22 MC
STANDARD BROADCAST
POLICE
A
550 600 700 800 1000 1200 1400 1600 KC
2.5 3.0 4.0 5.0 6.0 7.0 MC
B
120 M TROPICAL BROADCAST AMERICAN POLICE
AIRCRAFT
90 M TROPICAL BROADCAST
AMATEUR
KHABAROVSK
60 M TROPICAL BROADCAST
AIRCRAFT
49 M CINCINNATI - TORONTO
MEXICO CITY - CHICAGO - N. YORK
HAVANA - BERLIN - PITTSBURGH
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

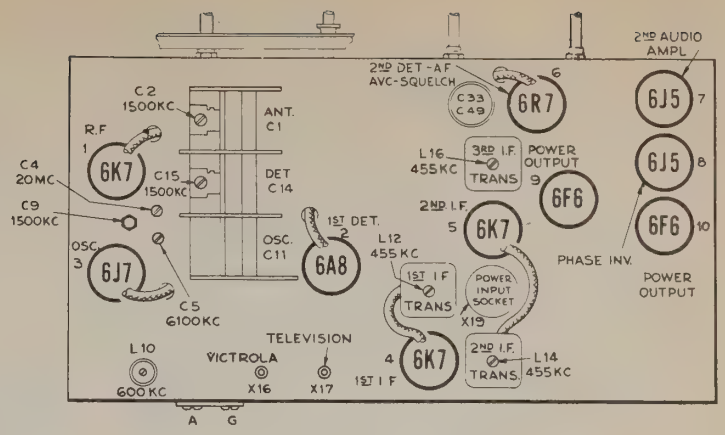
Tuning Dial, and Corresponding 0-180° Calibration Scale

The corresponding dial setting for any reading of the calibration scale can be determined by drawing a line straight up from this point; for example, 151° on the calibration scale corresponds to a dial reading of 1,500 kc on "A" band. Read instructions under "Alignment Procedure."

Alignment Procedure

(RADIO CHASSIS)

At Right—Tube and Trimmer Locations



Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment. — If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator. — For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the rear of the indicator-drive-cord drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The "O" mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

To determine the corresponding frequency for any setting of the calibration scales, refer to the accompanying drawing which shows the dial with O-180° calibration scales drawn at top and bottom.

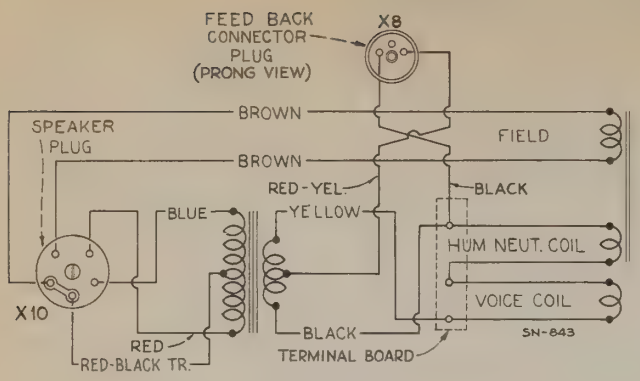
Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "O" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator approximately 1/16-inch above end dots at low-frequency ends of bands with gang condenser fully meshed. See that pointer does not rub background screen or dial face. The indicator has a spring clip for attachment to the cable.

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Set tuning gang to—	Adjust the following—	To obtain—
1	Turn fidelity switch to No. 3 radio (sharp).				
2	6K7 2nd I-F grid cap, in series with .01 mfd.	455 kc	Quiet point on "B" band	L15, L16 (3rd I-F Trans.)	Coincidental images on cathode-ray oscillograph, or max. output on output meter.
3	6K7 1st I-F grid cap, in series with .01 mfd.			L13, L14 (2nd I-F Trans.)	
4	6A8 1st Det. grid cap, in series with .01 mfd.			L11, L12 (1st I-F Trans.)	
5	Turn fidelity switch to No. 4 radio (broad). The curve on CRO should broaden out to a double peak and reduce gain nearly 50%.				
6	Turn fidelity switch to No. 3 radio for the following adjustments. Back out the "B" and "C" oscillator trimmers, C5 and C4. Preset "A" band oscillator trimmer, C9, approximately an inch out.				
7	Antenna terminal, in series with 100 mmf.	600 kc	600 kc (31°) "A" band	L10 (osc.)	Max. Output
8		1,500 kc	1,500 kc (151°) "A" band	C9 (osc.) C2 (ant.) C15 (det.)	Max. Output
9		600 kc	600 kc "A" band	L10 (osc.)	Rock in for Max. Output
10	Repeat step No. 8.				
11	Antenna terminal, in series with 300 ohms	6,100 kc	6,100 kc (140°) "B" band	C5 (osc.)	Max. Output *
12		20 mc	20 mc (146°) "C" band	C4 (osc.)	Rock in for Max. Output *
	Follow "Adjustments for Electric Tuning."				

* Use minimum capacitance peak if two peaks can be obtained.
Note: The oscillator tracks 455 kc **above** the signal on all bands.

Miscellaneous Data for Radio Chassis



Connections and Colors of Loudspeaker and Cable

Precautionary Lead Dress

(1) All A-C leads should be twisted together and dressed away from parts in chassis to prevent hum pickup.

(2) Keep pilot light leads away from 6R7 grid.

(3) Yellow, green, and black leads from fidelity switch to 1st i-f transformer must be twisted together and dressed away from chassis. The same applies to the 2nd i-f transformer leads.

Victrola Attachment

A jack (X-16) is located near the antenna terminal board for convenience in plugging in a Victrola Attachment. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.

TRK-120 for 105-125 Volts—50-60 Cycle Power Supply

General differences are as follows:

Chassis KC-4J

1. Tube No. 21 formerly RCA-5V4G changed to RCA-25Z6 and socket wiring revised.
2. Circuit changes are indicated on the schematic diagram (Fig. 9).

Chassis KK-7J

1. Capacitors C-118 (80 mfd.) and C-119 (10 mfd.) added in parallel with C-110.
2. Capacitor C-128 (0.25 mfd.) added in parallel with resistor R-166.
3. Capacitors C-113 (0.03 mfd.) and C-114 (0.03 mfd.) changed to C-121 (0.1 mfd.) and C-122 (0.1 mfd.)
4. Power transformer (T-5) changed to (T-8) having a 25v. heater winding to supply the RCA-25Z6 horizontal damping tube.
5. High voltage power transformer (T-6) changed to (T-9).
6. Resistor R-165 is added.
7. Inductance L-50 is 100 ohms in this model.
8. An RCA-5T4 replaces the RCA-5U4-G.

In addition Kinescope shielding is provided as follows:

1. A metallic conical section is installed in the cabinet to shield the Kinescope bulb.
2. A double metallic cylindrical section is installed with the deflecting yoke mounting assembly to shield the deflecting yoke proper. The accompanying illustration shows its assembly.

CAUTION: The conical shield is of the proper size to permit installing the 1803P4 Kinescope with its protective cardboard sleeve. The latter should **never** be removed.

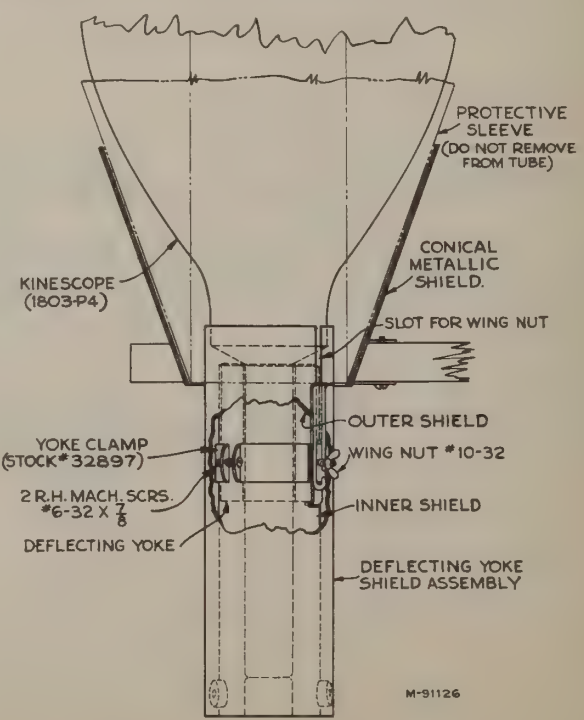
To prevent Kinescope breakage, when installing a Kinescope, the deflecting yoke and shield assembly must be in place. To prevent breakage of Kinescope when removing the deflecting yoke and shield assembly the Kinescope must be removed first.

Replacing or orienting deflecting yoke:

1. Remove Kinescope.
2. Loosen yoke support bracket wing nuts and remove complete yoke and shield assembly.
3. Remove outer shield. Loosen yoke clamp screws to permit removal or orientation of yoke. If it is necessary to orient yoke, pull yoke out so it extends about one inch. Tighten screws just enough to hold yoke but not too tight as it may be necessary to turn it in this extended position. Replace the inner shield and yoke in the yoke mounting brackets.
4. Replace Kinescope and protective glass cover.
5. Move the inner shield and yoke assembly vertically until yoke is gently touching Kinescope bulb. Tighten yoke bracket wing nuts.
6. Rotate yoke carefully with one hand to orient raster or picture.
7. Remove Kinescope.
8. Remove carefully (so as not to disturb yoke adjustment) the inner shield and yoke assembly. Place the latter on a flat surface with the extended yoke end flush to surface. Press inner shield gently down until yoke edge is flush with inner shield edge. Tighten yoke clamp screws evenly by first pulling one up and then the other.
9. Assemble outer shield to inner shield and yoke assembly so bottoms of shields are flush.
10. Replace complete shield and yoke assembly in the yoke support bracket.
11. Replace Kinescope and tighten protective glass cover.
12. Push gently complete assembly up flush against the Kinescope bulb. Tighten wing nuts.

IMPORTANT: 1. The hole in the conical metallic shield must line up with the hole in the protective sleeve to permit connection of the second anode cable.

2. Do not jar or drop the shields and keep away from the loudspeaker field coil to prevent magnetization.



Assembly Details, Showing Kinescope and Deflecting Yoke Shielding

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	TELEVISION CHASSIS ASSEMBLIES **KC-4F in TRK 120 (60 cycle)** **KC-4J in TRK 120 (50 cycle)** **KC-4H in TRK 90 (60 cycle)**
33387	Adjuster—Magnetite core and stud in tube for high frequency oscillator circuit adjustment (Used with L11, L12, L14, L15)
33835	Adjuster—Magnetite core and stud in tube, for high frequency oscillator circuit adjustment (Used with L13)
31253	Board—4 terminal antenna-ground terminal board
12884	Capacitor—Adjustable plunger type air trimmer (C6)
33097	Capacitor—4.7 mmfd. (neg. temp. coeff.) (C69)
33478	Capacitor—5.6 mmfd., 500 volts (C7)
33476	Capacitor—8.2 mmfd., 500 volts (C8)
33381	Capacitor—8.2 mmfd., (neg. temp. coeff.) (C71)
33380	Capacitor—12 mmfd., 500 volts (C24)
33100	Capacitor—18 mmfd., 500 volts (neg. temp. coeff.) (C19, C23)
33101	Capacitor—22 mmfd., (neg. temp. coeff.) (C64)
33102	Capacitor—47 mmfd., (neg. temp. coeff.) (C30, C35, C66, C72)
33103	Capacitor—68 mmfd., 500 volts (C31, C36, C15, C25, C40, C44, C49) (neg. temp. coeff.)
33477	Capacitor—80.5 mmfd., 500 volts (C16)
33104	Capacitor—82 mmfd. (neg. temp. coeff.) (C21, C22)
33106	Capacitor—115 mmfd. (C5)
33107	Capacitor—135 mmfd. (C4)
12725	Capacitor—150 mmfd., 400 volts (C10, C87)
33108	Capacitor—190 mmfd. (C3)
12488	Capacitor—270 mmfd. (C81)
33109	Capacitor—320 mmfd. (C2)
33110	Capacitor—390 mmfd. (C1)
31730	Capacitor—820 mmfd. (C123)
32788	Capacitor—820 mmfd., 400 volts (C84, C89)
12635	Capacitor—1,000 mmfd., 400 volts (C90)
4881	Capacitor—3,300 mmfd., 400 volts (C102)
34459	Capacitor—.0025 mfd., 1,400 volts (C124)
33584	Capacitor—.005 mfd., 1,200 volts (C11, C12, C13, C14, C18, C20, C26, C27, C29, C32, C33, C34, C37, C38, C39, C41, C42, C43, C45, C46, C47, C48, C52, C60, C62, C63, C65, C67, C68, C70, C75, C98, C99, C100)
4937	Capacitor—.01 mfd., 1000 volts (C74)
4870	Capacitor—.025 mfd., 400 volts (C107)
30882	Capacitor—.05 mfd., 200 volts (C94, C95)
32787	Capacitor—.05 mfd., 400 volts (C28)
4886	Capacitor—.05 mfd., 400 volts (C91)
4839	Capacitor—0.1 mfd., 400 volts (C73, C53, C77, C78, C85, C59, C88, C103)
12484	Capacitor—0.25 mfd., 350 volts (C86, C93, C101, C106, C80, C76, C105)
12741	Capacitor—.5 mfd. (C57)
32145	Capacitor—4 mfds., 450 volts—(Used in 50 cycle chassis only)
33158	Capacitor—10 mfd., 150 volts, 20 mfd., 25 volts, (C97, C104)
33878	Capacitor—10 mfd., 450 volts, 10 mfd., 450 volts, 10 mfd., 150 volts (C125, C126, C127)
33160	Capacitor—10 mfd., 350 volts, 10 mfd., 150 volts, 20 mfd., 25 volts, 20 mfd., 25 volts (C92, C79, C82, C83)
32045	Capacitor—15 mfd. (C96)
33161	Capacitor—20-50 mfd., 35 volts (C51, C108)
33243	Coil—Oscillator coil with core and stud (L11)
35582	Coil—1½ turn antenna coil, core, stud, and capacitor assembly (C5, L9, L10)
33647	Coil—2 turn antenna coil, core, stud and capacitor assembly (C4, L7, L8) (yellow or purple)
33646	Coil—3 turn antenna coil, core, stud and capacitor assembly (C3, L5, L6) (orange or white)
33645	Coil—5¾ turn antenna coil, core, stud and capacitor assembly (C2, L3, L4) (red or black)
33644	Coil—7½ turn antenna coil, core, stud and capacitor assembly (C1, L1, L2) (brown or blue)
35820	Coil—Peaking coil (L51, R156)
35821	Coil—Peaking coil (L52, R146)
35818	Coil—Peaking coil (L53, R148)
35817	Coil—Peaking coil (L54, R150)
35815	Coil—Peaking coil (L55, R154)
35819	Coil—Peaking coil (L56, R153)
35816	Coil—Peaking coil (L57, R155)
33228	Condenser—Oscillator "Fine tuning" condenser, located on range switch (C9)
33164	Control—Dual 1.2 meg. and 30,000 ohms "Vertical hold" and "Horizontal hold" controls (R106, R92)
33206	Control—6 ohm tapped "Horizontal centering" control (R98)
33210	Control—20 ohm tapped "Vertical centering" control (R114)
33209	Control—5,600 ohm, "Vertical linearity" control (R113)
35566	Control—50,000 ohm "Brightness" and 4,000 ohm "Contrast" dual control
33207	Control—560,000 ohm "Width" control (R94)
33208	Control—2.7 meg. "Height" control (R108)
4574	Plug—6-prong male plug for Television chassis power supply cable (X14)
16836	Plug—8-prong male plug for Television chassis power supply cable (X12)
14671	Resistor—33 ohms, ½ watt (R152)
35568	Resistor—Voltage divider comprising a 70, 7.4 and 5 ohm section (R162, R163, R164)
14074	Resistor—82 ohms, ½ watt (R64, R67, R14, R21, R28, R34)
13428	Resistor—150 ohms, ½ watt (R39)
13454	Resistor—270 ohms, ½ watt (R141)
13219	Resistor—270 ohms, 2 watts (R97)
30499	Resistor—470 ohms, ½ watt (R90, R95)
35567	Resistor—Voltage divider comprising a 900-3,100-6,600-7,800 and 1,470 ohm section (R158, R159, R160, R161)
14720	Resistor—1,000 ohms, ½ watt (R9, R65, R70, R18, R41, R25, R31, R37, R42)
14993	Resistor—1,200 ohms, 1/10 watt (R17)
12267	Resistor—1,200 ohms, ½ watt (R115)
14499	Resistor—1,500 ohms, ½ watt (R8, R24)
31920	Resistor—1,800 ohms, 1/10 watt (R16, R23, R30)
12194	Resistor—1,800 ohms, ½ watt (R112)
11863	Resistor—2,200 ohms, 1/10 watt (R36)
13486	Resistor—2,200 ohms, 1 watt (R6)
13031	Resistor—3,300 ohms, 1/10 watt (R19, R26)
12312	Resistor—3,300 ohms, ½ watt (R77, R87)
30150	Resistor—3,300 ohms, 1 watt (R7, R57)
12955	Resistor—3,900 ohms, ½ watt (R109)
35943	Resistor—3,900 ohms, ½ watt (R139)
30146	Resistor—4,700 ohms, ½ watt (R83, R99)
31789	Resistor—5,600 ohms, 1/10 watt (R12, R142, R143)
12265	Resistor—6,800 ohms, ½ watt (R11, R140)
14075	Resistor—8,200 ohms, ½ watt (R101, R102, R103)
14559	Resistor—10,000 ohms, ½ watt (R20, R27, R33, R13, R82, R84, R88, R100, R74, R147)
13097	Resistor—10,000 ohms, 1 watt (R79, R80)
13594	Resistor—15,000 ohms, 1/10 watt (R43)
35944	Resistor—15,000 ohms, ½ watt (R149)
14284	Resistor—22,000 ohms, 1/10 watt (R71)
13998	Resistor—22,000 ohms, ½ watt (R47, R49)
12738	Resistor—27,000 ohms, ½ watt (R91)
11300	Resistor—33,000 ohms, 1/10 watt (R10) (early production only)
35945	Resistor—33,000 ohms, ½ watt (R5, R138)
12412	Resistor—47,000 ohms, ½ watt (R93) (R10—late production only)
12010	Resistor—68,000 ohms, 1/10 watt (R32, R38, R69)
13715	Resistor—68,000 ohms, ½ watt (R63, R66)
14138	Resistor—68,000 ohms, ½ watt (R15, R22, R29, R35, R40, R68)
14023	Resistor—82,000 ohms, ½ watt (R78)
30435	Resistor—82,000 ohms, 1 watt (R144)
14560	Resistor—100,000 ohms, ½ watt (R72, R85, R86, R89, R104, R145)
30180	Resistor—120,000 ohms, ½ watt (R4)
12264	Resistor—220,000 ohms, ½ watt (R51, R111)
12285	Resistor—470,000 ohms, ½ watt (R46, R59, R96)
12486	Resistor—560,000 ohms, ½ watt (R151)
13730	Resistor—1 meg., ½ watt (R1, R2, R76, R75, R73, R52, R60, R81)
2546	Resistor—1 meg., 1 watt (R3)
30208	Resistor—1.2 meg., ½ watt (R105)
5028	Resistor—1.8 meg., ½ watt (R107)
12679	Resistor—2.2 meg., ½ watt (R110)
33229	Roller—Rubber friction roller for oscillator condenser drive. Part of range switch assembly
33165	Socket—2-prong female socket for Video output to Kinescope (X3)
33011	Socket—4-contact female socket for Kinescope deflecting yoke (X1)
31251	Socket—8-contact octal type socket
18007	Socket—Ceramic octal socket for 6L6 "Hor. out" and 6J5 "Osc."
14278	Socket—Television audio output pin socket (X5)
33227	Switch—Range switch with shield plate and mounting studs—less coils, condenser and friction roller (S1, S2, S3)
33330	Transformer—"1st det. P1" I-F transformer (L17, L18) (br. and br.)
33331	Transformer—"1st det. P2" I-F transformer (L19, L20) (brown and red)
33334	Transformer—"1st pix P1" I-F transformer (L21, L22, L23, L24) (brown and green)
33335	Transformer—"1st pix P2" (L25) or "2nd pix P2" (L30) I-F transformer (brown and blue)
33338	Transformer—"1st sound" I-F transformer (L45, L46) (orange and red) (Used in early production)
33526	Transformer—"1st sound" I-F transformer (L45, L46) (red and white) (Used in late production)

STOCK No.	DESCRIPTION
33516	Transformer—"2nd pix P1" I-F transformer (L26, L27, L28, L29) (orange and orange).
33339	Transformer—"2nd sound" I-F transformer (L47, L48) (orange and orange)
33333	Transformer—"3rd pix" I-F transformer (L31, L32, L33) (orange and blue)
33336	Transformer "4th pix" I-F transformer (L34, L35, L36) (brown and black)
33337	Transformer—"5th pix" I-F transformer (L37, L38) (brown and white)
32899	Transformer—Horizontal oscillation transformer (T1)
9862	Transformer—Horizontal output transformer (T2)
32900	Transformer—Vertical output transformer (T4).
32898	Transformer—Vertical oscillation transformer (T3)
	3-BAND RADIO RECEIVER CHASSIS RC-427F in TRK-120 (60 cycle) RC-427F in TRK-120 (50 cycle) RC-427G in TRK-90 (60 cycle)
31863	Board—Antenna-ground terminal board
32232	Body—Station setting contact body and spring.
32090	Bracket—Motor mounting bracket
32635	Cable—Indicator pointer drive cable — 60-in. length
14392	Capacitor—4.7 mmfd. (C46)
31353	Capacitor—15 mmfd. (C6)
31270	Capacitor—100 mmfd. (C41, C42)
12720	Capacitor—100 mmfd. (C38, C16)
12724	Capacitor—120 mmfd. (C12, C21)
13003	Capacitor—180 mmfd. (C3, C17)
12952	Capacitor—330 mmfd. (C39)
31433	Capacitor—560 mmfd. (C8)
31552	Capacitor—680 mmfd. (C19, C20, C23, C24)
32197	Capacitor—3,900 mmfd., 500 volts (C7)
31405	Capacitor—6,000 mmfd., 500 volts (C10)
5107	Capacitor—.0025 mfd., 700 volts (C35, C36, C55)
33584	Capacitor—.005 mfd., 1,200 volts (C53)
11315	Capacitor—.015 mfd., 400 volts (C31)
4870	Capacitor—.025 mfd., 400 volts (C32, C50)
32787	Capacitor—.05 mfd., 400 volts (C27, C25)
4839	Capacitor—0.1 mfd., 400 volts (C22, C18, C26, C34, C52)
12484	Capacitor—.25 mfd., 350 volts (C13, C28, C48, C45, C51)
12741	Capacitor—0.5 mfd., 150 volts (C47)
18530	Capacitor—20-20 mfd., 350 volts (C33, C49)
32088	Capacitor—Motor capacitor 60 mfd., 40 volts (C30)
31263	Coil—"A" band antenna coil (L1, L2)
31265	Coil—"A" band detector coil (L6, L7)
31296	Coil—"A" band oscillator coil (L10)
31980	Coil—"B" and "C" band antenna coil (L3, L4, L5)
31783	Coil—"B" and "C" band oscillator coil (L8, L9)
31234	Condenser—3-gang variable condenser (C1, C11, C14, C2, C15)
12714	Condenser—Air trimmer condenser (C9)
31292	Condenser—Double section trimmer capacitor 3-30 mmfd., each section (C4, C5)
31971	Contact—Push button switch contacts comprising 11 contacts riveted on insulating strip
31972	Contact—Push button switch contacts comprising 14 contacts riveted on insulating strip
31231	Contact—Station setting contact tip
33446	Control—"Power-volume control" — 1½ meg. (R12, S10, S11)
32634	Cord—Band indicator and variable condenser drive cord
31269	Core—Core and stud for 1st, 2nd, or 3rd I-F transformer
32093	Damper—Flywheel for rear end of motor shaft
32096	Disc—Friction disc and pinion gear
32091	Drive—Friction drive gear assembly
31273	Drum—Variable condenser drive drum
31239	Gear—Knob shaft drive gear and hub
31532	Indicator—Band indicating strip (Model TRK-12 only)
31304	Indicator—Band indicating strip (Model TRK-9 only)
31480	Lamp—6.3 volt electric tuning set-up lamp Mazda No. 47
11891	Lamp—6.3 volt dial lamp Mazda No. 44
31969	Lockplate—Push button switch lockplate comprising 10 contact locks in 1 strip
32095	Motor—Electric tuning drive motor complete (M1)
31228	Plate—Station selector contact plate — less plungers
31227	Plate—Station selector mounting plate—mounts on rear of variable condenser
12493	Plug—Female connector for speaker cable (X9).
31271	Pulley—Drive pulley fastens on station selector knob shaft
31280	Pulley—Indicator pointer drive cord pulley
31272	Pulley—Range switch pulley
14720	Resistor—1,000 ohms, ½ watt (R7)
12267	Resistor—1,200 ohms, ½ watt (R6)
12312	Resistor—3,300 ohms, ½ watt (R5)
14559	Resistor—10,000 ohms, ½ watt (R10)
12695	Resistor—15,000 ohms, ½ watt (R14)
12738	Resistor—27,000 ohms, ½ watt (R13)
12454	Resistor—33,000 ohms, ½ watt (R3, R4)
12266	Resistor—39,000 ohms, ½ watt (R23)
12286	Resistor—56,000 ohms, ½ watt (R30)
14560	Resistor—100,000 ohms, ½ watt (R11, R16, R20, R32, R31)
13698	Resistor—180,000 ohms, ½ watt (R17)
12199	Resistor—270,000 ohms, ½ watt (R15, R33, R34)
18020	Resistor—470,000 ohms, 1 watt (R24)
12486	Resistor—560,000 ohms, ½ watt (R21)
12012	Resistor—1 meg., 1/10 watt (R8)
13730	Resistor—1 meg., ½ watt (R1, R2, R19)
12679	Resistor—2.2 meg., ½ watt (R9)
31548	Resistor—Voltage divider consisting of one 1,500, one 2,950, one 3,400, one 30 and one 3,165 ohm section (R25, R26, R27, R28, R29)
14887	Retainer—Drive cord pulley retainer
32086	Roller—Rubber friction roller for front end of motor shaft
31233	Rotor—Station selector rotor disc—mounts on rear of variable condenser shaft
5042	Screw—No. 8-32 set screw for drive pulley
14350	Screw—No. 8-32 square head set screw for rotor disc, Stock No. 31233
31681	Shaft—Dial drive knob shaft
31364	Socket—Dial or electric tuning set-up lamp socket
31251	Socket—Octal type Radiotron or power supply socket
14278	Socket—Pin socket for phono or television input with mounting plate (X16) (X17)
31279	Spring—Band indicator tension spring
13638	Spring—Indicator drive cord tension spring
31970	Spring—Push button switch lock bar spring
31232	Spring—Station setting tip spring
12007	Spring—Stud retaining spring for I-F adjuster.
31418	Spring—Variable condenser drive cord tension spring
33447	Switch—H. F. tone control phono-radio-television and power switch (S4, S5, S6, S7, S12)
31979	Switch—Range switch (S1, S2, S3)
31968	Switch—Station selector push button switch complete
31565	Transformer—1st I-F transformer complete (L11, L12, C19, C20, L19)
31551	Transformer—2nd I-F transformer complete (L13, L14, C23, C24, L20)
31549	Transformer—3rd I-F transformer complete (L15, L16, C41, C42)
32231	Washers—Comprising one metal washer, two fibre washers and one solder lug or retainer for station setting body
32094	Washers—Assorted washers for mounting damper on motor shaft
	POWER SUPPLY UNIT **TELEVISION AUDIO RECEIVER** RS-83E in TRK-120 (60 cycle) RS-83E in TRK-120 (50 cycle) RS-83E in TRK-90 (60 cycle)
14531	Capacitor—25 mfd. filter capacitor (C1)
33606	Plug—8-contact male plug for power supply cable (X20)
31251	Socket—5U4G Radiotron socket
33445	Transformer—110 V. 60 cycle power transformer (T1)
	7,500 VOLT TELEVISION POWER UNIT KK-7F in TRK-120 (60 cycle) KK-7J in TRK-120 (50 cycle) KK-7H in TRK-90 (60 cycle)
33016	Bushing—Porcelain bushing and spring
33288	Cable—Insulated connector complete with cable for Kinescope (2nd anode)
30036	Capacitor—.005-.005 mfd., 1,000 v. (C115, C116)
33018	Capacitor—0.03 mfd., 7,500 volt (C113, C114)
34331	Capacitor—0.1 mfd., 7,500 volt (C121, C122) (Used in 50 cycle model only)
18388	Capacitor—0.25 mfd., 600 volt (C128)
32400	Capacitor—20 mfd., 450 volt (C111, C112)
33023	Capacitor—80-10 mfd., 400 volt (C109, C110, C118, C119)
14854	Choke—Filter choke (L49)
32940	Choke—Filter choke (L50) (Used in TRK-120, 50 cycle only)
35887	Choke—Filter choke (L50) (Used in TRK-90 and TRK-120, 60 cycle only)
30314	Clip—Plate connector for 2V3G Radiotron
33037	Control—Focus control, 400,000 ohms (R129) (Used in TRK-90 only)
33971	Control—Focus control, 400,000 ohms (R129) (Used in TRK-120 only)
33002	Coupling—Flexible bronze coupling

STOCK No.	DESCRIPTION
10907	Fuse—3 ampere, 250 volt
34527	Fuse—¾ ampere glass type fuse
33015	Insulator—Stand-off insulator only — less hardware
32937	Knob—Focus control knob
33244	Plug—2-prong male connector for A.C. power cord (X22)
33166	Plug—2-prong male plug for Kinescope grid-cathode cable (X4)
35897	Resistor—60 ohms, 10 watt (R165)
33501	Resistor—330,000 ohms, 1W (1,000V.) (R126, R130)
33502	Resistor—470,000 ohms, 1W (1,000V.) (R127, R137, R166)
33593	Resistor—560,000 ohms, 1 watt (1,000V.) (R128)
33554	Resistor—820,000 ohms, 1W (1,000V.) (R131, R132, R133, R134, R135, R136)
33024	Shaft—Bakelite shaft for focus control
18007	Socket—Ceramic octal base socket and retaining ring for high voltage rectifier
33245	Socket—Kinescope socket, less cable (X11)
31251	Socket—Octal base 5T4 rectifier, or television power supply socket (X13)
12143	Socket—6-prong television power supply socket (X15)
32909	Support—Rectifier socket, plate, and stand-off insulator assembly
32939	Transformer—Filament power transformer (T7), 105-125 volts, 60 cycle (Used in TRK-90, TRK-120, 60 cycles and TRK-120 50 cycles)
32938	Transformer—Low voltage power transformer (T5), 105-125 volt, 60 cycle (Used in TRK-90 and TRK-120, 60 cycles only)
34302	Transformer—Low voltage power transformer (T5), 105-125 volts, 50 cycle (Used in TRK-120, 50 cycle only)
9861	Transformer—High voltage power transformer (T6), 105-125 volts, 60 cycle (Used in TRK-90 and TRK-120, 60 cycle only)
35888	Transformer—High voltage power transformer (T6), 105-125 volts, 50 cycle (Used in TRK-120, 50 cycle only)
	SPEAKER ASSEMBLY RL-70F-5
31825	Cap—Cone center dust cap
11469	Coil—Hum neutralizing coil (L21)
11234	Coil—Speaker field coil (L17)
31275	Cone—Speaker cone assembly (L18)
31567	Plug—3-prong male feed back cable plug (X8)
31539	Plug—5-prong speaker plug (X10)
31556	Speaker—Speaker complete (RL-70F-5)
31557	Transformer—Speaker output transformer (T1)
	MISCELLANEOUS ASSEMBLIES TRK-120 TRK-90
31358	Button—Station selector push button
33676	Cable—17½-inch shielded audio lead with plugs (X6, X18) (Model TRK-9 only)
33480	Cable—38-inch shielded audio lead with plugs (Model TRK-12 only) (X6, X18)
34600	Cable—Kinescope cable and socket (TRK-120 only)
34601	Cable—Kinescope cable and socket (TRK-90 only)
33246	Cable—Low capacity Kinescope grid cable (Model TRK-120 only)
33605	Cable—Low capacity Kinescope grid cable (Model TRK-90 only)
33597	Cap—Blue pilot lamp "Bulls Eye"
32897	Clamp—Deflecting yoke clamp assembly
4573	Connector—2-prong female connector for power supply circuit (X23)
33363	Connector—2-prong female connector, used on interlock cable (X21)
31456	Cover—Eight protective covers for push button markers
32815	Cushion—Kinescope masking cushion (Model TRK-120 only)
33019	Cushion—Kinescope masking cushion (Model TRK-90 only)
33643	Cushion—Television chassis mounting cushion with screw, spacer and washer (sufficient for one chassis)
35894	Decalcomania—"1-2-3-4-5" decal
35890	Decalcomania—"Contrast-Brightness" decal
35893	Decalcomania—"Fine Tuning" decal
35891	Decalcomania—"Horizontal and Vertical Holding" decal
35896	Decalcomania—"Power-Volume, tone, tuning, range" decal
35392	Decalcomania—"RCA Victor" decal
35892	Decalcomania—"Station selector" decal
35895	Decalcomania—"Victrola-Radio-Television" decal
33442	Dial—Three-band glass dial scale
35889	Escutcheon—Dial escutcheon less buttons, button shaft and dial scale
32083	Frame—Dial frame with screen less pointer, carriage and rod
33074	Glass—6⅞ by 8¾ inch safety protective glass (Model TRK-90 only)
33076	Glass—8¾ by 11⅛ inch safety protective glass (Model TRK-120 only)
33282	Hinge—Piano type lid hinge and screws
33468	Knob—Radio tuning, volume or range selector knob
33470	Knob—Television "Contrast," "Hor. hold" or "Fine Tuning" knob
33471	Knob—Television "Brightness" or "Vert. hold" knob
33472	Knob—Television "Station selector" knob
33469	Knob—"Victrola-Radio-Television-Fidelity selection" knob
11891	Lamp—6.3 V. pilot lamp, Mazda No. 44
31589	Marker—Complete set of call letter markers
31458	Marker—"Dial Tuning" push button marker
31457	Marker—"Victrola" push button marker
33075	Mirror—20½ by 14¾ in. viewing mirror
33225	Nut—Speed nut for mounting high frequency coil assemblies
4577	Plug—2-prong male plug for power supply circuit (X24)
33244	Plug—2-prong male plug, used on interlock cable (X22)
33166	Plug—2-prong male plug for Kinescope grid-cathode cable (X4)
32816	Plug—4-prong male plug for deflecting yoke cable (X2)
12493	Plug—5-prong female speaker cable plug (X9)
4574	Plug—6-prong male plug for Television chassis power supply cable (X14)
16836	Plug—8-prong male plug for Television chassis power supply cable (X12)
31542	Pointer—Station selector pointer with carriage
31287	Rod—Dial frame pointer slide rod
32083	Screen—Dial frame diffusing screen with rivets
4560	Screw—¼-20 by 1¼ in. long, machine screw, washer and lockwasher for chassis mounting (12 required)
33517	Sleeve—Bell mouth sleeve for screw-driver adjustments (Model TRK-90 only)
14270	Spring—Knob spring for Stock Nos. 33468, 33471, 33472, 33469 knobs
30330	Spring—Knob spring for Stock Nos. 33470, knob
33384	Switch—Interlock switch and cover
31522	Support—Left hand lid support
31478	Support—Right hand lid support
9857	Yoke—Deflecting yoke complete with cable and 4-prong plug (L43, L44, R62)

RCA Victor

VICTROLA MODELS O-10, O-14, O-16, and O-19

Hand-Wound Portables

TECHNICAL INFORMATION AND SERVICE DATA

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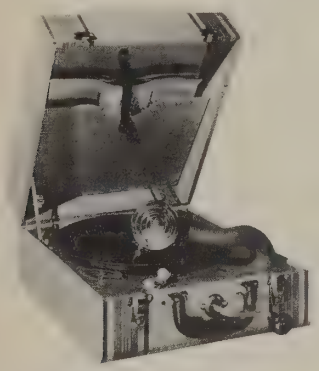
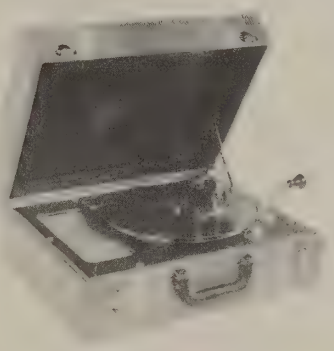
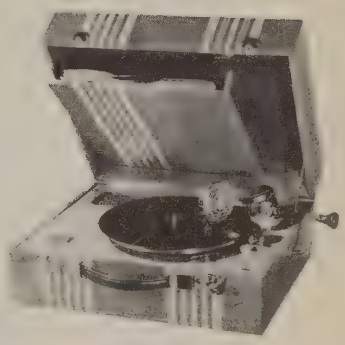


MODELS O-10*, O-19



MODEL O-14



MODEL O-16

Height	7 -in.	7 -in.	7¼-in.
Width	12½-in.	16¼-in.	16⅜-in.
Depth	14¾-in.	13 -in.	14¼-in.

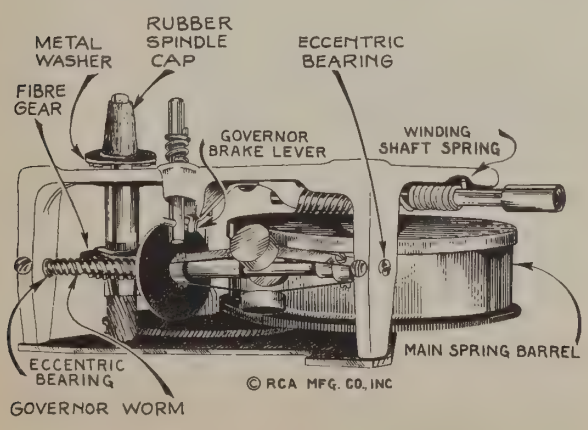
* Model O-10 is same as O-19 but in black or blue covering.

CAUTION.—Allow the motor mechanism to run down completely before attempting adjustment, repairs, or replacements.

Governor Adjustments.—The mesh of the worm and fiber gears is adjusted by rotation of the eccentric spindle bearings. The adjustments should be made so that the worm meshes properly with the fiber gear and rotates freely without binding. The bearings should be accurately aligned with each other. The minimum of spindle end-play which permits smooth operation should be used.

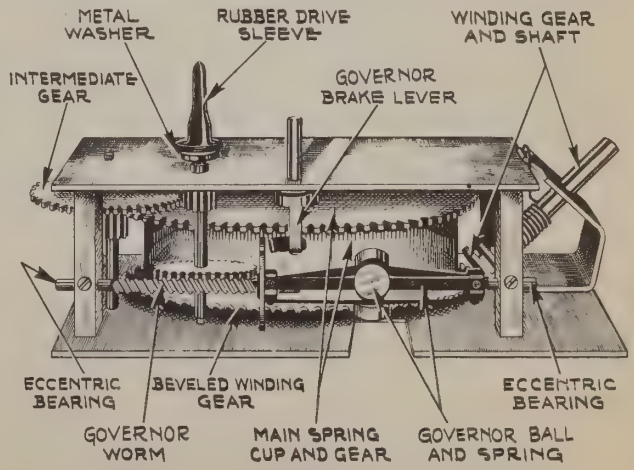
Speed Regulator Lever.—After assembly, adjust the speed regulator until the turntable rotates at 78 r. p. m.; loosen the speed regulator screw and set pointer to center of speed indicator scale; tighten screw and recheck turntable speed.

Lubrication.—All moving parts of the motor should be thoroughly cleaned and lubricated every six months to prevent excess wear and to assure proper operation. A small amount of grease should be applied to the worm gear of the governor, the gear of the winding shaft, and on the small pinion gear. All other points, including regulator friction pad, should be lubricated with light oil. All motor parts should be covered with a light film of oil to prevent rusting.



SIDE-WIND MOTOR

Used in O-14, O-16, and some production of O-10, O-19.



ANGLE-WIND MOTOR

Used in some production of O-10, O-19.

First Edition

Trademark "Victrola," "RCA Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

Replacement Parts Models O-10 and O-19

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	MISCELLANEOUS ASSEMBLIES
33691	Arm—Tone arm less neck, base, washer, ring, screw and lockwasher
33682	Brake—Turntable brake
33678	Cover—Needle cup cover
33680	Cup—Needle cup
33681	Escutcheon—Speed lever escutcheon for side wind motor
33693	Escutcheon—Speed lever escutcheon for angle wind motor
11771	Foot—Cabinet foot
33696	Handle—Carrying handle
33695	Hinge—Lid hinge
33685	Key—Winding key for side wind motor
33686	Key—Winding key for angle wind motor
33687	Mounting—Motor mounting assembly
33692	Neck—Tone arm neck
33690	Screw—Screw and lockwasher to fasten neck on tone arm
30368	Sound Box
33683	Spring—Turntable brake spring
33694	Support—Cabinet lid support
33684	Support—Sound box support
33689	Support—Taper tube support
33369	Turntable—Turntable assembly for side wind motor
33677	Turntable—Turntable assembly for angle wind motor
33688	Washer—Bearing washer and retaining snap ring
	MOTOR ASSEMBLIES (Side-Wind Motor)
33373	Bearing—One set governor shaft bearings
33371	Cap—Turntable spindle cap
33366	Gear—Intermediate drive gear and shaft
13858	Gear—Winding worm gear—located on winding key shaft
13859	Gear—Winding gear—located on spring barrel shaft
13857	Governor—Governor assembly complete
13854	Motor—Spring motor complete
13865	Screw—Needle holding screw
13860	Shaft—Winding key shaft and socket—less winding gear
33372	Sleeve—Rubber drive sleeve and metal damper plate
33367	Spindle—Turntable spindle and drive gears
13851	Spring—Turntable brake spring
13835	Spring—Mainspring, spring barrel and drive gear
13862	Weight—Governor weight and spring
	MOTOR ASSEMBLIES (Angle-Wind Motor)
33702	Ball—Governor ball and spring assembly
33698	Bearing—Governor spindle bearings
33707	Gear—Beveled winding gear
33704	Gear—Intermediate gear assembly complete
33705	Gear—Main spring cup and gear
33699	Gear—Winding gear, shaft and crank socket
33701	Governor—Governor assembly complete
33697	Plate—Top plate assembly
33700	Sleeve—Rubber drive sleeve and metal damper plate
33703	Spindle—Turntable spindle complete with gear and pinion
33706	Spring—Main spring
33708	Spring—Winding shaft clutch spring

Replacement Parts Models O-14 and O-16

STOCK No.	DESCRIPTION
	MODEL O-14
13849	Arm—Tone arm, less sound box
33373	Bearing—One set governor shaft bearings
13850	Brake—Turntable brake complete
33371	Cap—Turntable spindle cap
13852	Cup—Needle cup
13847	Escutcheon—Speed regulator escutcheon
33366	Gear—Intermediate drive gear and shaft
13858	Gear—Worm gear—located on winding shaft
13859	Gear—Winding gear—located on spring barrel
13857	Governor—Complete
13846	Indicator—Speed regulator arm and pointer
33685	Key—Winding key
13854	Motor—Complete
13865	Screw—Needle screw
13860	Shaft—Winding shaft and socket—less gear
33372	Sleeve—Rubber drive sleeve and damper plate
30368	Sound Box
33367	Spindle—Turntable spindle shaft and gear
13851	Spring—Brake spring
13835	Spring—Main spring and barrel
33368	Turntable—Complete with black cover
13862	Weight—Governor weight and spring
	MODEL O-16
34509	Arm—Tone arm—less sound box
33373	Bearing—One set governor shaft bearings
30088	Brake—Turntable brake complete
33371	Cap—Turntable spindle cap
30090	Cover—Hinged cover for needle cup
30091	Cup—Needle cup
30092	Escutcheon—Speed regulator escutcheon
33366	Gear—Intermediate drive gear and shaft
13858	Gear—Worm gear—located on winding shaft
13859	Gear—Winding gear—located on spring barrel
13857	Governor—Complete
30093	Indicator—Speed regulator arm and pointer
34510	Key—Winding key
13854	Motor—Complete
13865	Screw—Needle screw
13860	Shaft—Winding shaft and socket—less gear
33372	Sleeve—Rubber drive sleeve and damper plate
30095	Sound Box
33367	Spindle—Turntable spindle shaft and gear
13851	Spring—Brake spring
13835	Spring—Main spring and barrel
34511	Turntable—Complete with brown cover
13862	Weight—Governor weight and spring

RCA Victor Models VA-22, and OSC-22

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 28—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Specifications

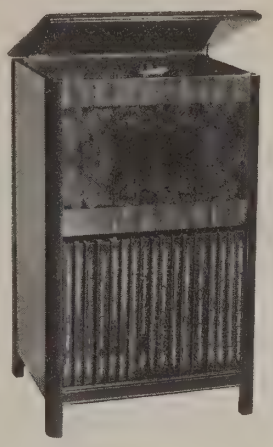
MODEL VA-22

Victrola Attachment

Record Capacity..... Eight 10-inch or Seven 12-inch
MOTOR..... Constant-speed, self-starting
PICKUP..... Crystal
Pickup Impedance..... 0.1 meg., at 1,000 cycles
Average Output..... 1½ volts across 0.5 meg.

POWER SUPPLY RATINGS

A6..... 105-125 volts, 60 cycles, 25 watts
A5..... 105-125 volts, 50 cycles, 25 watts
B2..... 105-125 volts, 25 cycles, 25 watts
CABINET DIMENSIONS.....32-in. x 19⅝-in. x 15½-in.
Weight, gross..... 59 lbs.



Specifications

OSC-22

Wireless Oscillator

FREQUENCY RANGE..... Approx. 530-625 kc
TUBE COMPLEMENT
(1) RCA-6SA7..... Modulator—Oscillator
(2) RCA-25Z6-G..... Half-Wave Rectifier
(3) Type B-86-A..... Ballast Resistor

POWER SUPPLY RATINGS

A-C Rating.... 105-125 volts, 25-60 cycles, 35 watts
D-C Rating..... 105-125 volts, 35 watts

DIMENSIONS

Chassis Base..... 7½-in. x 4½-in x 2½-in.

At Left—Model VA-22

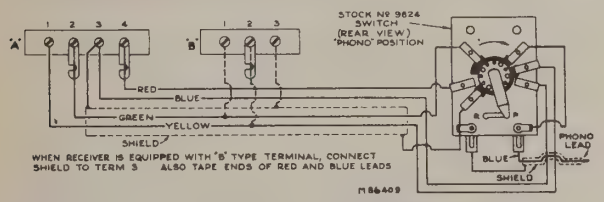
Connecting Model VA-22 to Radio Receivers

Methods of connecting the Victrola Attachment to various types of audio systems are given in the accompanying text and illustrations. Also included are the model numbers of the various RCA receivers to which the particular method applies. The data given requires that an RCA Stock No. 9824 Radio-Phono switch be used for switching from radio to phonograph, as desired. For ease in connecting the "phono" lead to the Stock No. 9824 switch, the male plug on the end of the lead should be removed by unsoldering or by cutting it off.

1939 RCA RADIOS OF THE "90" SERIES:

Plug male connector on the end of the "phono" lead into the female connector on the receiver chassis. Push or turn the "Phono" switch to "Phono" position, and operate the Victrola Attachment according to instructions.

RADIO RECEIVERS HAVING "PHONO" TERMINAL BOARDS.



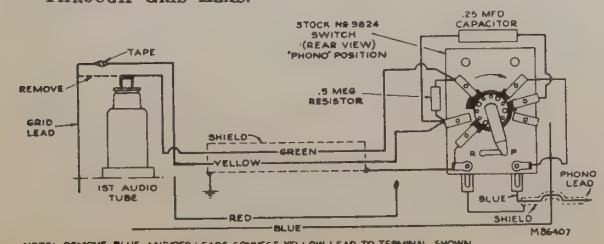
RCA Radio Receivers to which the above illustration applies: 5T1, 5T4, 5T5, 5T6, 5T7, 5T8, 6T5, 8T2, 8T11, 8K11, 85T5, 86E, 86K, 86T, 86T1, 86T4, 86K7, 86T44, 87K, 87T, 87K1, 87K2, 87T2, 88K, 810K, 810K1, 810T, 810T4, 811K, 812K, 813K, 816K, 811T.

For following Receivers, Yellow lead should go on Terminal No. 1, Green lead on Terminal No. 2: 6K2, 6T2, 6K3, 6T10, 7T1, 7K1, 85T8, 86T8, 87T1, 86T2, 86T6, 6K10.

Insulate shield of switch wires from chassis, on following RCA Receivers: 5T, 6T, 6K, 6K1, 7T, 7K, 7X, 8T, 8K, 86X4, 87EY, 87X, 87Y, 8T10, 7X1, 8K1.

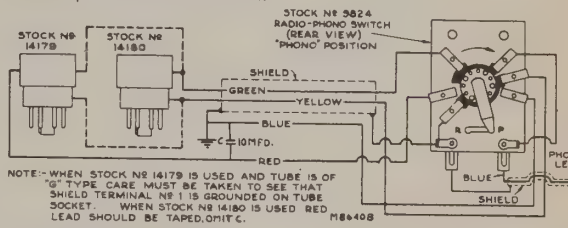
Receivers having a Four Terminal Board: 9K, 9T, 9K1, 9K2, 9K3, 9K10, 10T, 10K, 10K1, 13K, 15K. Reverse Red and Blue leads to Terminal Board of C9-6, T9-9, T8-16, C8-17.

RADIO RECEIVERS WHOSE FIRST AUDIO TUBE IS OF THE GRID CAP TYPE, AND FIXED BIAS FOR TUBE IS OBTAINED THROUGH GRID LEAD.



In general, the Victrola Attachment must be used with radio receivers having at least two stages of high-gain audio amplification. The output of the Victrola Attachment should be connected to the input of the first audio tube, and at the same time the output of radio receiver portion of the chassis should be shorted or opened, to prevent radio signals being heard while the Victrola Attachment is in operation.

RADIO RECEIVERS USING 6C5 OR 6J5, 6C5G OR 6J5G, TUBE FOR FIRST AUDIO AMPLIFIER.


STOCK Nº 14179
STOCK Nº 14180
STOCK Nº 9824 RADIO-PHONO SWITCH (REAR VIEW) "PHONO" POSITION
SHIELD
GREEN
YELLOW
BLUE
C=10MFD.
RED
PHONO LEAD
NOTE:- WHEN STOCK Nº 14179 IS USED AND TUBE IS OF "G" TYPE CARE MUST BE TAKEN TO SEE THAT SHIELD TERMINAL Nº 1 IS GROUNDED ON TUBE SOCKET. WHEN STOCK Nº 14180 IS USED RED LEAD SHOULD BE TAPED. OMIT C.
M86408

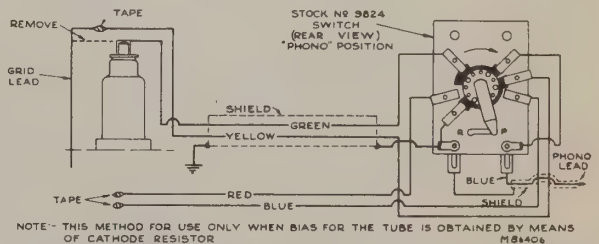
Stock No. 14179 Adaptor opens grid circuit, and inserts 2,700 ohm resistor in cathode of 6C5 or 6J5 tubes, for bias on Phono reproduction.

Stock No. 14180 Adaptor opens grid circuit of 6C5 or 6J5 tube.

Stock No. 14180 Adaptor necessary for RCA: C11-1, C13-2, T10-1, C11-3, C13-3.

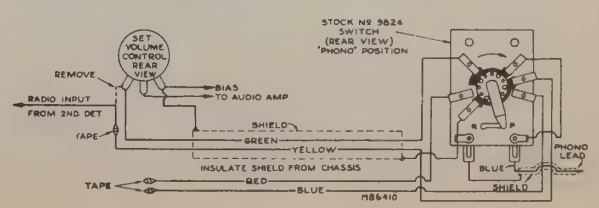
Stock No. 14179 Adaptor necessary for RCA: C15-3, C15-4.

RADIO RECEIVERS WHOSE FIRST AUDIO AMPLIFIER TUBE IS OF THE GRID CAP TYPE.



RCA Receivers for which above method applies: 125, 128, 128E, 224E, 225, 226, T6-1, C6-2, T6-9, T7-5, C7-6, T7-12, C7-14, T8-14, C8-15, T8-18, C8-19, C8-20, C9-4, T9-10.

RADIO RECEIVERS WHERE THE VOLUME CONTROL IS IN THE AUDIO INPUT CIRCUIT.



Automatic Record Changer

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc. are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and revolving the turntable by hand. Six turntable revolutions are required for one change cycle.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

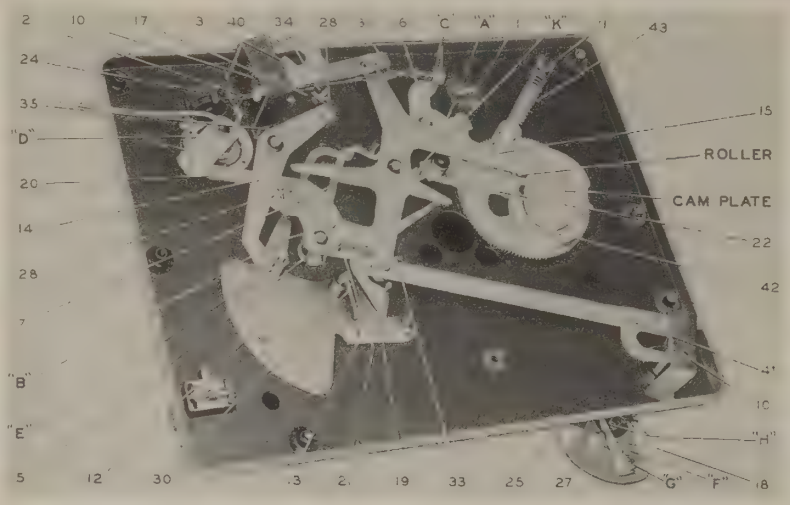
The 10 and 12 inch records must be absolutely flat for smooth operation when using a mixture of the two sizes.

A shorting switch, located in the pickup head, operates due to pressure when the pickup is placed on the pickup rest.

ADJUSTMENTS

A. Main Lever.—This lever is basically important in that it interlinks the various individual mechanisms which control needle landing, tripping, record separation, etc. One adjustment is provided for the main lever. Rotate the turntable until the changer is out-of-cycle; and adjust rubber bumper bracket (A) so that the roller clears the nose of the cam plate by 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the record is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pickup is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the trip finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.



NOTE: Numbers refer to parts—letters refer to adjustments

C. Pickup Lift Cable Screw.—During the record change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pickup lift cable. To adjust pickup for proper elevation, stop the changer "in-cycle" at the point where pickup is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknuts "C" to obtain 1 inch spacing between needle point and turntable top surface.

D. & E. Needle Landing on Record.—The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10 inch record. Position of eccentric stud "E" governs the landing of the needle on a 12 inch record; this, however, is dependent on the proper 10 inch adjustment.

To adjust for needle landing, place 10 inch record on turntable; push index lever to reject position and return to the 10 inch position; see that pickup locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on the record; then see that pin "V" on lever "14" is in contact with "Step T" on lever "17." The correct point of landing is 4-11/16 inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17." Leave approximately 1/32 inch end play between hub of lever "20" and pickup base bearing, and tighten the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone pointed screw "D."

After adjusting for needle landing on a 10 inch record, place 12 inch record on turntable; push index lever to reject and return to 12 inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5-11/16 inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be toward the rear of the motor board, otherwise incorrect landing may occur with 10 inch records.

F. & G. Record Separating Knife.—The upper plate (knife) "25" on each of the record posts serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "27" be accurately maintained. The spacing for the 10 inch record is nominally .058 inch, and for the 12 inch record is .075 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "F" to give .055—.061 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F" adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072—.078 inch.

H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustment be such that the record is released from both shelves at the same instant. To adjust, place a 12 inch record on the turntable, rotate mechanism into cycle to the point where tone arm is at maximum distance outward from turntable; lift record upward until it is in contact with both separating knives, then loosen screws "H" and shift record shelves so that the curved inner edges of the shelves are uniformly spaced at least 1/16 inch from record edge. Tighten the blunt nose screw "H," run mechanism through cycle several times to check action, then tighten cone pointed screw "H."

If record shelves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown).—When the changer is out-of-cycle, the front lower edge of the pickup head should be 5/16 inch above surface of motor board. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication.—Petrolatum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motor board.

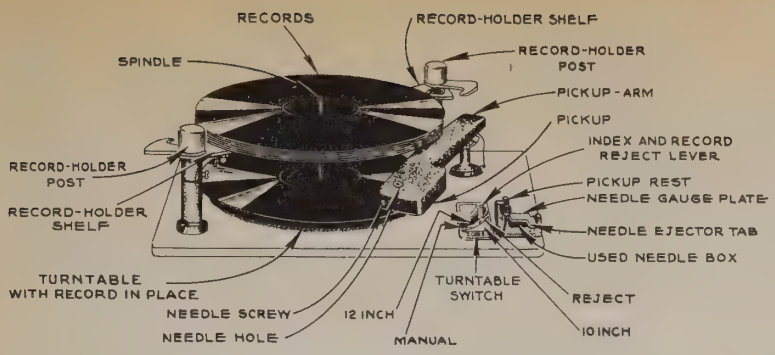
Apply a few drops of light machine oil to the motor spindle bearing and oil hole adjacent to the spindle bearing. The oil hole has a screw plug.

Do not allow oil or grease to come in contact with, rubber mounting of tone arm base, rubber bumper, or rubber spindle cap.

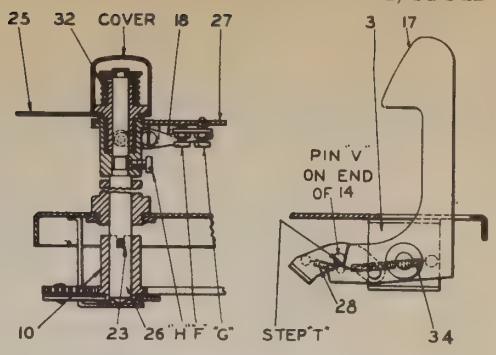
MISCELLANEOUS SERVICE HINTS

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual misadjustments will enable ready adjustment in most cases.

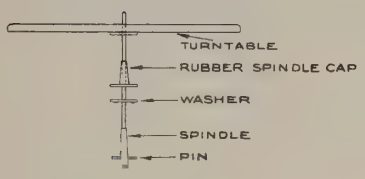
1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A."
2. Needle does not land properly on both 10 and 12 inch records—Make complete adjustments "D" and "E."
3. Needle does not land properly on 12 inch record but correct on 10 inch—Effect adjustment "E."
4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B." Also, see that levers "7" and "12" are free to move without touching each other.
5. Pickup strikes lower record of stack or drags across top record on turntable—Adjust lift cable per adjustment "C."
6. Needle does not track after landing—Friction clutch "5" adjustment "B" may be too tight; bind in tone arm vertical bearing; levers "7" and "12" fouled; or pickup output cable twisted.
7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.
8. Wow in record reproduction—Record is defective; or instrument is not being operated at normal room temperature (65° F).
9. Record knives strike edge of records—Records warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.
10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H."
11. Needle lands in 10 inch position on 12 inch record or misses record when playing both types mixed—Increase tension of pickup locating lever spring "34."



Top View of Automatic Record Changer

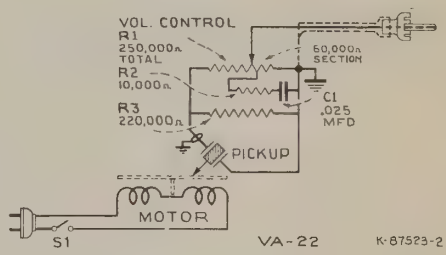


Details of Record Shelf Posts, and Locating Lever Assemblies



At Left—Turntable Assembly

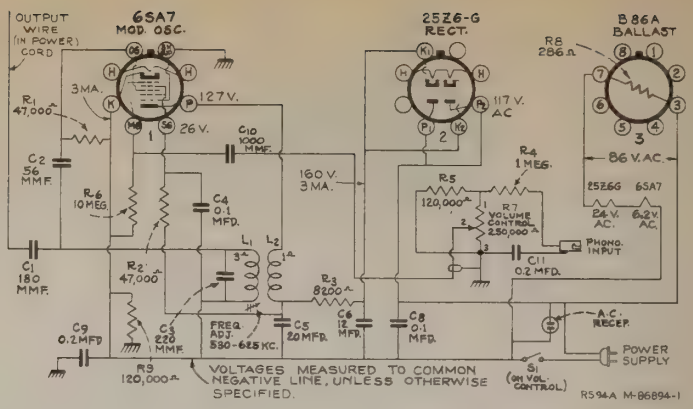
At Right—Model VA-22 Schematic Diagram



Replacement Parts Model VA-22

STOCK No.	DESCRIPTION
	PICKUP AND ARM ASSEMBLIES
33096	Arm—Pickup arm complete—less crystal cartridge, needle screw, and cable
32635	Cable—Pickup arm lift cable and clips
32885	Cable—Output cable and plug
31156	Crystal—Pickup crystal cartridge and needle screw
33114	Damper—Viscoloid damper for crystal armature
31160	Screw—Pickup needle screw
31161	Shaft—Pickup pivot arm and shaft assembly
	OPERATING MECHANISM
31134	Bracket—Pickup locating lever mounting bracket (3)
32878	Cam—Cam and drive gear (42)
6808	Clutch—Trip lever friction clutch assembly (5)
31129	Cover—Cap for top of record post
32883	Damper—Motor spindle rubber drive sleeve and metal damper plate
31116	Finger—Trip lever friction finger assembly (7)
32879	Gear—Rack gear for front left-hand record post (41)
32880	Gear—Rack gear for rear right-hand record post (40)
31121	Gear—Record post gear (10)
31123	Guide—Main lever spring guide (11)
31114	Lever—Index lever assembly (12)
31137	Lever—Index lever tension spring lever (13)
31138	Lever—Locating lever and pawl assembly (14)
31113	Lever—Main lever assembly (15)
31140	Lever—Pickup lift cable lever and spring assembly (16)
31135	Lever—Pickup locating lever assembly (17)
31130	Lever—Record separator elevating lever complete with adjustment screws (18)
31132	Lever—Trip detaining lever (19)
31115	Lever—Trip lever assembly (20)
31131	Lever—Trip regulator lever (21)
31133	Pawl—Trip pawl assembly (22)
31124	Pin—Record post drive pin (23)
14207	Roller—Pickup lift cable roller and bracket assembly (24)
31118	Screw—Cone pointed set screw for trip lever hub or record post shelf
4563	Screw—Pickup lift cable screw and nuts
31117	Screw—Special screw to adjust friction clutch tension (B)
31126	Separator—Record separator knife (25)
31122	Shaft—Record separator post shaft (26)
31125	Shelf—Record post shelf assembly (27)
3676	Spring—Cam pawl tension spring on main gear (12 turns, .190-in. O.D., 4-3/64-in. lg.)
32882	Spring—Main lever tension spring (43) (18 turns, .6-in. O.D., 3-in. lg.)
14190	Spring—Pickup locating lever short spring or locating lever pawl tension spring (28) (16 turns, .180-in. O.D., 19/32-in. lg.)
31136	Spring—Index lever tension spring (30) (25 turns, .190-in. O.D., 15/16-in. lg.)
3666	Spring—Pickup lift cable tension spring (31) (20 turns, .195-in. O.D., 1-in. lg.)
31127	Spring—Record separator pressure spring (32) (8 turns, 5/8-in. O.D., 3/4-in. lg.)
14191	Spring—Trip detaining lever tension spring (33) (15 turns, .190-in. O.D., 3/4-in. lg.)
31875	Spring—Pickup locating lever tension spring (34) (14 turns, .220-in. O.D., 27/32-in. lg.)
32436	Spring—Locating lever tension spring (35) (16 turns, .182-in. O.D., 21/32-in. lg.)
32881	Turntable complete
31128	Washer—"C" washer for top of record post
	MOTORBOARD ASSEMBLIES
31149	Base—Tone arm mounting base
32876	Board—Motorboard complete with all riveted and welded posts and brackets—less operating mechanisms
14209	Bumper—Main lever rubber bumper (1)
9848	Cup—Used needle cup, rest, and lid complete
32877	Escutcheon—Index escutcheon
31151	Guide—Pickup lift cable guide (coil spring, 80T 2-in. large) (2)
31150	Mounting—Pickup arm base rubber mounting complete
31155	Spring—Needle cup lid tension spring
	MOTOR ASSEMBLIES
32956	Coil—Field coil and laminations for 25-cycle motor
32955	Coil—Field coil and laminations for 50-cycle motor
32954	Coil—Field coil and laminations for 60-cycle motor
32960	Gear—Motor spindle gear and pin
32873	Motor—Motor complete, 25-cycle, 110 volts AC.
32872	Motor—Motor complete, 50-cycle, 110 volts AC.
32871	Motor—Motor complete, 60-cycle, 110 volts AC.
32959	Spindle—Turntable spindle complete with fibre gear for 25-cycle motor
32958	Spindle—Turntable spindle complete with fibre gear for 50-cycle motor
32957	Spindle—Turntable spindle complete with fibre gear for 60-cycle motor
32875	Switch—Motor control switch (S1)
	MISCELLANEOUS ASSEMBLIES
33595	Cable—Shielded output cable with male plug
4870	Capacitor—.025 mfd. (C1)
30698	Hinge—Cabinet lid hinge
31564	Holder—Needle card holder
12673	Knob—Volume control knob
14559	Resistor—10,000 ohms, ½ watt (R2)
12264	Resistor—220,000 ohms, ½ watt (R3)
4119	Screw—Headless set screw for knob, No. 12673
31470	Springs—Motorboard mounting springs, screw, and washers (4 req'd)
33594	Support—Cabinet lid support
31108	Volume control (R1)

OSC-22
Wireless Oscillator



At Right—Model OSC-22 Schematic Diagram

Precautionary Lead Dress.—

1. Keep 110-volt leads away from oscillator coil.
2. Leads to oscillator coil must be short and direct.

The RCA Victor Wireless Oscillator is an adapter unit used to convert your Victrola Attachment, such as the RCA Victor Model VA-22, into a wireless record player. This permits you to play phonograph records through your radio receiver without any connecting wires from the Victrola Attachment to the Radio Receiver.

INSTALLATION

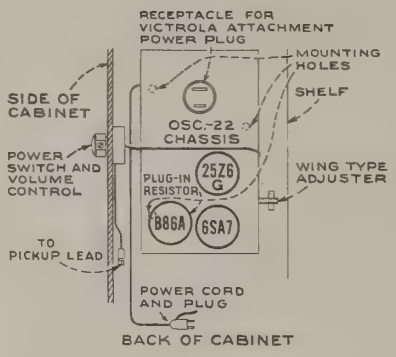
Certain RCA Victrola Attachments such as the VA-22 are provided with a side shelf inside the cabinet for mounting the Wireless Oscillator. Three holes are drilled in the shelf correctly spaced for the oscillator mounting bolts to go through and screw into the holes in the OSC-22 chassis base. To install the OSC-22 first detach the VA-22 power cord from the electric outlet, then:

1. Look in the back of the VA-22 or similar Victrola cabinet and locate the connection from the pickup to the volume control on the side of the cabinet. This is a length of wire with a connector plug on one end. Disconnect the plug from the bayonet socket and then loosen the set screw and remove the knob and the volume control on the other end of the wire, together with the wire, from the VA-22 cabinet. It is attached to the cabinet by a nut and washer.
2. Mount the OSC-22 on the cabinet shelf with the three mounting screws and washers provided.
3. Mount the OSC-22 Power Switch and Volume Control unit in the location from which the VA-22 volume control was removed, using the washer and nut taken from the VA-22 volume control. Be sure that the locating pin on the new control is in the correct position. Attach knob on shaft of Power Switch and Volume Control unit and tighten up the set screw.
4. Insert the pickup plug into the connector on the cable of the newly installed Volume Control of the OSC-22.
5. Insert the plug on the end of the VA-22 power cord into the power receptacle on the OSC-22 chassis base.
6. Insert the plug on the end of the OSC-22 power cord into the electric outlet.

OPERATION

CONTROLS AND MOVING MECHANISM

In order to obtain best reproduction, the newly installed Volume Control should first be turned on about 2/3 full and the Volume Control on your radio receiver turned to the point that gives the greatest volume you are likely to require. Then all control of volume may be made with the knob on the Wireless Victrola Attachment. In particularly noisy locations it may be preferable to set the Volume Control of the Wireless Victrola Attachment at about 2/3 full and regulate with the volume control knob on the receiver.



The Victrola Adjustment.—On the back of the OSC-22 chassis is a small adjusting rod to give reproduction at the most convenient point on your radio receiver dial. With your radio receiver in operation, set the Tuning Control to bring the pointer on the Standard Broadcast Scale to a point at the low frequency end between 530 and about 630 kilocycles, 530 is preferable, at which no station can be obtained. Then set your Wireless Victrola Attachment in operation and turn the adjusting rod on the OSC-22 slowly and carefully until the record reproduction is heard at its best.

Antenna Modification.—If, due to your particular special conditions, insufficient volume or excessive noise interference affects record reproduction, a simple remedy is to connect a wire from the Wireless Victrola Attachment to your radio antenna lead. This is easily accomplished by means of a length of wire to cover the distance between the Victrola Attachment and Radio Receiver. One end of this should be wound 3 or 4 turns around the outside of the short wire projecting from the OSC-22 plug on the power cord. The other end of the wire should be wound 3 or 4 turns around the outside of the receiver antenna lead. When an RCA Master Antenna is used, the wire should be wound around the counterpoise lead where it is attached to the A-3 terminal of your radio receiver antenna terminal board.

Radio Receiver Controls.—Your radio receiver picks up the record selection as it does a broadcast program. So after the Victrola Adjustment is made, you must tune your radio receiver to the signal from the Wireless Victrola Attachment between 530 and about 630 kilocycles. Do this according to the instructions for operating your particular receiver and turn the Tuning Control to bring the pointer on the dial scale to the low frequency end of the Standard Broadcast band, about 530 to 630 kilocycles, and tune in accurately with the Wireless Victrola Attachment playing a selection. This point is your "Victrola" station. If you have a radio with Push Button Tuning you can set a push button and label it "Victrola." *The push button or switch labeled "Victrola," "Record Player" or "Phono" on RCA Victor Radio Receivers previous to 1939 is of no use with the Wireless Victrola Attachment.*

PLAYING

Plug the power cord from the OSC-22 into a convenient house outlet, then to play records proceed as follows:

1. Turn on the power to your radio receiver.
2. Set the tuning knob to your new "Victrola" station (530 to 630 kilocycles), or if you have specially adjusted a push button, press it.
3. Turn on power to the Wireless Victrola Attachment.
4. Make the set-up for playing records in accordance with the original instructions accompanying the Victrola Attachment.
5. Turn the Wireless Victrola Attachment Volume Control about 2/3 fully clockwise.
6. Adjust radio receiver Tuning knob to accurately tune in the phonograph selection.
7. Turn Radio Receiver Volume Control to give the loudest reproduction you are likely to require.
8. Adjust the Wireless Victrola Attachment Volume Control to suit.
9. Adjust radio receiver Tone Control if desirable.

Replacement Parts OSC-22 Wireless Oscillator

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
33793	Ballast—Ballast resistor tube—Type B86A (R8)		33792	Receptacle—A.C. receptacle	
12723	Capacitor—56 mmfd. (C2)		33793	Resistor—Ballast resistor tube—Type B86A (R8)	
13003	Capacitor—180 mmfd. (C1)		14075	Resistor—8,200 ohms, ½ watt (R3)	
12694	Capacitor—220 mmfd. (C3)		12412	Resistor—47,000 ohms, ½ watt (R1, R2)	
4839	Capacitor—0.1 mfd. (C4, C8)		13734	Resistor—120,000 ohms, ½ watt (R5, R9)	
33834	Capacitor—0.2 mfd. (C9, C11)		13730	Resistor—1 meg., ½ watt (R4)	
32576	Capacitor—Electrolytic, one section 20 mfd., and one section 12 mfd. (C5, C6)		13601	Resistor—10 meg., ½ watt (R6)	
12635	Capacitor—1,000 mfd. (C10)		31251	Socket—Tube socket	
32501	Coil—Oscillator coil (L1, L2)		33793	Tube—Ballast resistor tube—Type B86A (R8)	
			33794	Volume control and switch (R7, S1)	

RCA Victor

MODEL O-50 PORTABLE VICTROLA

(phonograph only)

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 13 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

TUBE COMPLEMENT

(1) RCA—6SF5 ..... A-F Amplifier
(2) RCA—6F6-G ..... Output
(3) RCA—5Y3-G ..... Rectifier

POWER SUPPLY RATINGS

A-6 ..... 105-125 volts, 60 cycles, 90 watts
A-5 ..... 105-125 volts, 50 cycles, 90 watts

LOUDSPEAKER

Type ..... 8 inch electrodynamic
V. C. Impedance at 400 cycles ..... 3.2 ohms

PICKUP

Type ..... Crystal
Impedance ..... 100,000 ohms at 400 cycles
Average Output .... 1½ volts at 1,000 cycles with 250,000 ohms load

	Height	Width	Depth
Cabinet Dimensions (inches) ..	8¾	15	16⅞
Chassis Base Dimension (inches)	2¼	7⅜	4¼

Overall Chassis Height ..... 6½ inches
Weight ..... 26 lbs. (net) ..... 31 lbs. (shipping)

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	AMPLIFIER ASSEMBLY
13580	Capacitor—1800 mmfd. (C2)
5107	Capacitor—.0025 mfd. (C7)
30303	Capacitor—.0035 mfd. (C6)
4937	Capacitor—.01 mfd. (C8)
4870	Capacitor—.025 mfd. (C1, C3, C11)
33214	Capacitor—Electrolytic, 2 sections 15 mfd. and 2 sections 20 mfd. (C4, C5, C9, C10)
33212	Control—Tone control switch (S3)
30868	Plug—2-contact female motor cable plug
12493	Plug—5-contact female speaker cable plug
31388	Resistor—390 ohms, 1 watt (R5)
12312	Resistor—3300 ohms, ½ watt (R4)
14559	Resistor—10,000 ohms, ½ watt (R2, R8)
12738	Resistor—27,000 ohms, ½ watt (R1)
12264	Resistor—220,000 ohms, ½ watt (R6)
12285	Resistor—470,000 ohms, ½ watt (R7)
14278	Socket—Pickup input socket
32537	Socket—Tube socket
14796	Transformer—Power transformer 105-125 volts, 50-60 cycle (T1)
33215	Volume control and power switch (R3, S1)
	PICKUP AND ARM ASSEMBLIES
33216	Arm—Pickup arm—less crystal, needle screw, and cable
33218	Base—Pickup arm mounting base and pivot shaft
33217	Crystal—Pickup crystal cartridge and needle screw
33114	Damper—Viscoloid damper for pickup armature
31160	Screw—Pickup needle screw
	MOTOR ASSEMBLIES
32650	Field—Motor field coils and laminations, 110 volts, 50 cycle (84569—8)
32336	Field—Motor field coils and laminations, 110 volts, 60 cycle (84569—7)
33220	Motor—105-125 volts, 50 cycles—less mounting plate (M1)
33219	Motor—105-125 volts, 60 cycles—less mounting plate (M1)

STOCK No.	DESCRIPTION
33361	Shaft—Turntable spindle shaft and gear—50 cycle
33360	Shaft—Turntable spindle shaft and gear—60 cycle
	AUTOMATIC SWITCH ASSEMBLIES
33221	Cam—Cam assembly comprising main and auxiliary cams, hub, and set screws
32864	Lever—Actuating lever with roller and mercury tube clip
14195	Screw—No. 10-32 x 5/16 cone pointed set screw for cam hub
32869	Screw—No. 10-32 x 5/16 set screw for cam hub
32868	Spring—Actuating lever tension spring
32867	Spring—Cam tension spring
32865	Support—Switch support and terminal board
32866	Switch—Mercury tube with leads (S2)
31608	Washer—"C" washer for actuating lever shaft
	SPEAKER ASSEMBLIES (84804—1)
33406	Cone—Speaker cone and voice coil (L1)
5118	Plug—3-contact male for speaker
33222	Speaker complete
33407	Transformer—Output transformer (T2)
	MISCELLANEOUS ASSEMBLIES
11865	Cup—Needle cup
31464	Damper—Damper plate and rubber sleeve for spindle
11771	Foot—Cabinet foot
32633	Handle—Carrying handle
13085	Hinge—Cabinet lid hinge
31355	Knob—Volume control or tone control knob
33223	Mounting—Complete set motor mounting screws, washers, and spacers
31054	Mounting—Pickup arm mounting cushion, washer, and nut
30870	Plug—2-contact male for motor leads
31048	Plug—2-contact male plug for phono. cable
33364	Support—Cabinet lid support (LH)
33673	Support—Pickup arm support
33404	Turntable

First Edition

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

General Description and Service Data

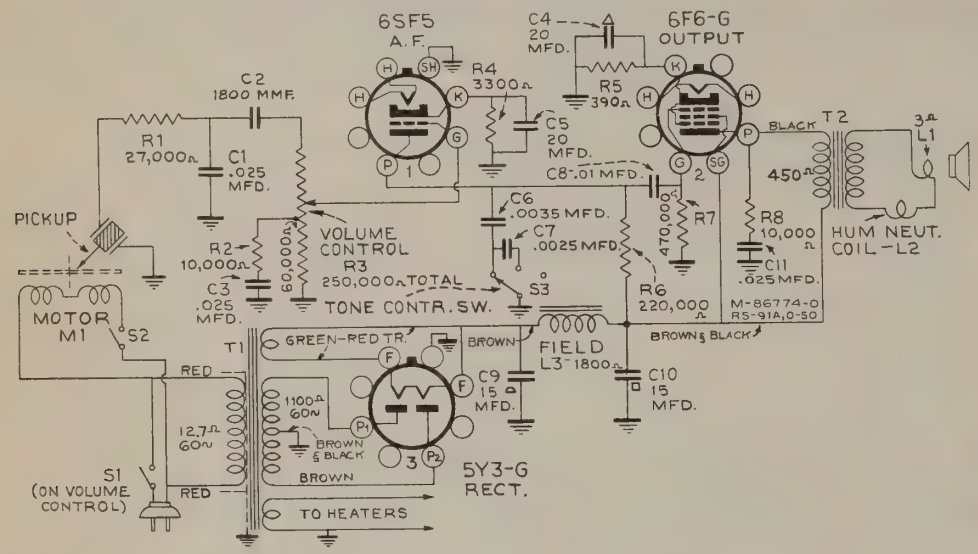
The Model O-50 Portable Electric Victrola consists of a crystal pickup, a two-stage audio amplifier, and eight-inch electrodynamic speaker, and a motor turntable mechanism with automatic mercury switch for starting and stopping—all housed in a portable carrying case of modern design and appearance.

The phonograph motor is a self-starting, constant-speed induction type. It should be lubricated every six months by applying a few drops of light machine oil to the spindle bearing and oil hole.

The motor spindle is tapered, and a conical rubber piece fits snugly on the spindle. The hole in the turntable bushing is tapered to fit the rubber. This provides an excellent self-centering floating mounting.

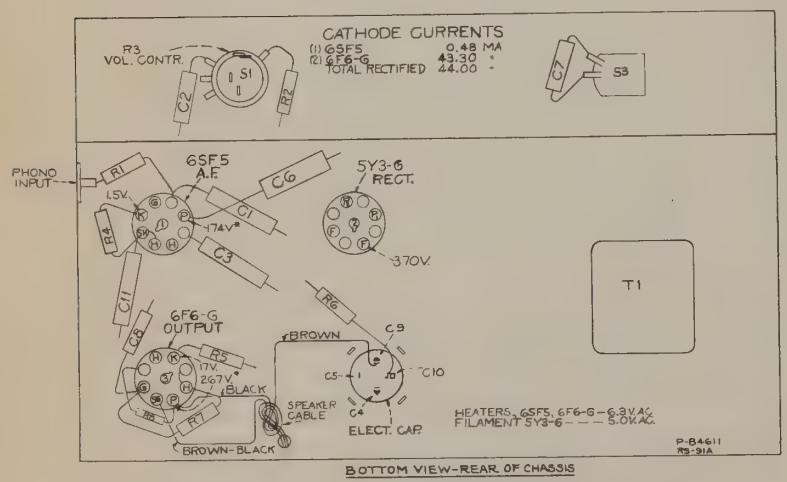
A metal washer is placed on the spindle under the rubber piece. The washer has ears on the under side which fit over a pin that projects through the spindle.

The motor switch is automatic for both starting and stopping, and when properly adjusted, will turn the motor on as the pickup is moved from the pickup rest toward the turntable. The switch should be adjusted so that it will snap into the "off" position when the pickup needle is 1¾ inches from the center line of the spindle. The motor may be shut off at any time by placing the pickup on the pickup rest.

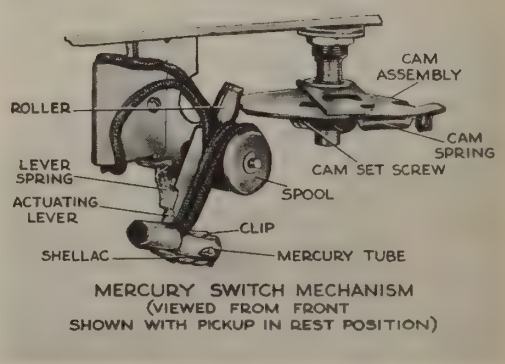


Schematic Circuit Diagram

Model O-50



Parts Layout and Socket Voltages



Switch Mechanism
(Shown with pickup in rest position)

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point, volume control at minimum. Values should hold within approximately ±20% with 117-volt a-c supply.

***NOTE:** Values with star (*) are operating voltages in circuits with high series-resistance, and when measured will read lower depending on the voltmeter loading.

RCA Victor

VICTROLA MODEL R-60

(phonograph only) RS-91B

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 46 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

TUBE COMPLEMENT

(1) RCA—6SF5 ..... A-F Amplifier
(2) RCA—6F6-G ..... Output
(3) RCA—5Y3-G ..... Rectifier

POWER SUPPLY RATINGS

A-6 ..... 105-125 volts, 60 cycles, 90 watts
A-5 ..... 105-125 volts, 50 cycles, 90 watts

LOUDSPEAKER (RL-79-2)

Type ..... 6-inch electrodynamic
V. C. Impedance at 400 cycles ..... 3.4 ohms

PICKUP

Type ..... Crystal
Impedance ..... 100,000 ohms at 400 cycles
Average Output .... 1½ volts at 1,000 cycles with 250,000 ohms load

	Height	Width	Depth
Cabinet Dimensions (inches)	8 1/16	14	9¾
Chassis Base Dimensions (inches) ..	2¼	7⅜	4¼

Overall Chassis Height ..... 6½ inches
Weight ..... 20 lbs. (shipping)

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	AMPLIFIER ASSEMBLIES RS-91B
5107	Capacitor—.0025 mfd. (C7)
30303	Capacitor—.0035 mfd. (C6)
33584	Capacitor—.005 mfd. (C2)
4858	Capacitor—.01 mfd. (C8)
4870	Capacitor—.025 mfd. (C1, C3, C11)
33214	Capacitor—Electrolytic, comprising 2 sections 15 mfd. and 2 sections 20 mfd.
33212	Control—Tone control
33215	Control—Volume control and power switch
30868	Plug—2 contact female plug for motor leads
5119	Plug—3 contact female plug for speaker
31388	Resistor—390 ohms, 1 watt (R5)
12312	Resistor—3,300 ohms, ½ watt (R4)
14559	Resistor—10,000 ohms, ½ watt (R2, R8)
12738	Resistor—27,000 ohms, ½ watt (R1)
12264	Resistor—220,000 ohms, ½ watt (R6)
12285	Resistor—470,000 ohms, ½ watt (R7)
32537	Socket—Tube socket
14796	Transformer—Power transformer, 110 volts, 60 cycles
	PICKUP AND ARM ASSEMBLIES
33591	Arm—Pickup arm shell
34299	Arm—Pivot arm and shaft
34758	Bushing—Rubber and metal bushings for pickup pivot arm
33122	Crystal—Pickup unit crystal cartridge
33123	Damper—Viscoloid damper
33529	Screw—Needle screw
	MOTOR ASSEMBLIES
35248	Arm—Turntable drive wheel arm and stud
34276	Coil—Field coil complete
34280	Clip—Spring clip for turntable shaft and drive wheel
35247	Mounting—1 set of motor plate mountings
35246	Plate—Motor plate with spindle bearing
34277	Pulley—Motor pulley and set screw
34279	Shaft—Turntable shaft and spring clip
34281	Spring—Drive wheel arm spring
34278	Wheel—Turntable drive wheel and spring clip
	SPEAKER ASSEMBLIES (RL-79-2)
32907	Cap—Speaker cone center dust cap
32903	Coil—Speaker field coil (L3)
32906	Coil—Speaker hum neutralizing coil (L2)
5118	Plug—3-prong male for speaker
32905	Transformer—Output transformer (T2)
	AUTOMATIC SWITCH ASSEMBLIES
32863	Cam—Cam assembly comprising main and auxiliary cam, hub and set screws
32864	Lever—Actuating lever with roller and mercury switch clip
31118	Screw—No. 10-32 x 5/16 fillister cone pointed set screw
32868	Spring—Actuating lever tension spring
32867	Spring—Cam tension spring
32865	Support—Switch support and terminal board
32866	Switch—Mercury tube with leads (S2)
31608	Washer—"C" washer for holding actuating lever
	MISCELLANEOUS ASSEMBLIES
4288	Cap—Pickup lead cap
4286	Ferrule—Pickup lead ferrule and bushing
31355	Knob—Tone control or volume control knob
34264	Mounting—Motor mounting hardware
30870	Plug—2 contact male plug for motor leads
32610	Rest—Pickup rest
14270	Spring—Retaining spring for knob Stock No. 31355
34265	Turntable—Complete

First Edition

Trademarks "Victrola" and "RCA Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

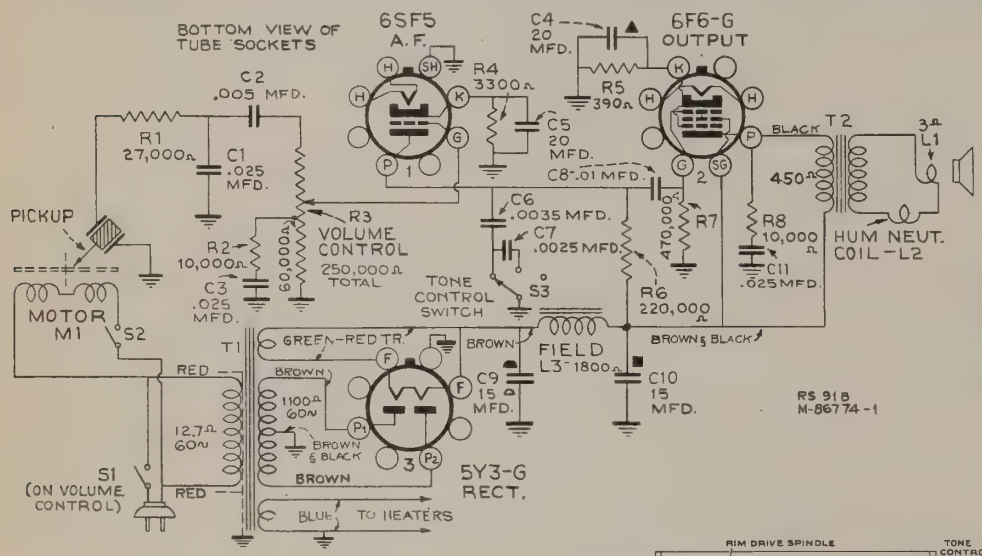
General Description and Service Data

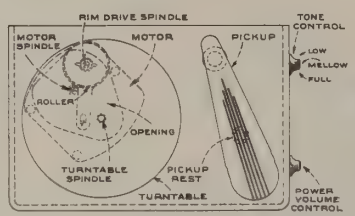
The Victrola Model R-60 consists of a crystal pickup, a two-stage audio amplifier, a six-inch electrodynamic speaker, and a rim-drive motor turntable mechanism with automatic mercury switch for starting and stopping—all housed in a wood cabinet of modern design and appearance.

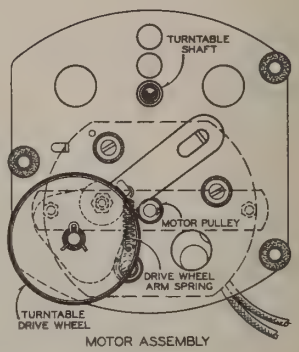
The phonograph motor is a self-starting, constant-speed induction type. It should be lubricated every six months by applying a few drops of light machine oil to the top and bottom motor spindle bearings, to the turntable spindle, and to the turntable drive wheel bearing.

CAUTION: Keep oil away from drive bushing on top of motor spindle and from rubber driving tire on turntable drive wheel.

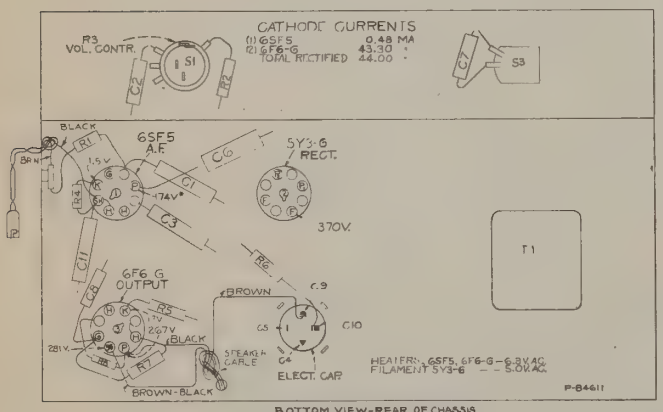
The motor switch is automatic for both starting and stopping, and when properly adjusted, will turn the motor on as the pickup is moved from the pickup rest toward the turntable. The switch should be adjusted so that it will snap into the "off" position when the pickup needle is 1¾ inches from the center line of the spindle. The motor may be shut off at any time by placing the pickup on the pickup rest.



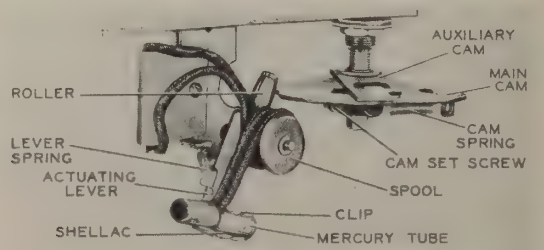




MOTOR ASSEMBLY



BOTTOM VIEW-REAR OF CHASSIS
PARTS LAYOUT AND SOCKET VOLTAGES



MERCURY SWITCH MECHANISM
(VIEWED FROM FRONT
SHOWN WITH PICKUP IN REST POSITION)

***NOTE:** Values with star (*) are operating voltages in circuits with high series-resistance, and when measured will read lower depending on the voltmeter loading.

Measurements made to chassis unless otherwise indicated. Values should hold within approximately ±20% with 117-volt a-c supply.

RCA Victor MODEL R-98 (Chassis No. RS-77)

Five-Tube, A-C, Electric Victrola (Phono. only)

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 20 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

RCA Tube Complement

(1)	RCA-6J5	1st Audio Amplifier
(2)	RCA-6J5	2nd Audio Amplifier
(3)	RCA-2A3	Power Output
(4)	RCA-2A3	Power Output
(5)	RCA-5U4-G	Rectifier

Power Supply Rating

A	105-125 volts, 50-60 cycles, 175 watts
A-6	105-125 volts, 60 cycles, 175 watts

Power Output

Undistorted	12 watts
Maximum	13.5 watts

Loudspeaker

Type	Eight-Inch Electrodynamic
Voice Coil Impedance	1.3 ohms at 400 cycles

Motor Board

Motor	Self-starting Induction
Turntable Speed	78 r.p.m. (adjustable)

Pickup

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles

Cabinet Dimension	Height 14¼ inches	Width	19¾ inches	Depth	14 inches
Chassis Base Dimensions	Height 2¾ inches	Width	16¼ inches	Depth	7¾ inches
Weight (Shipping)	54 pounds		Weight (Net)		47½ pounds

Replacement Parts

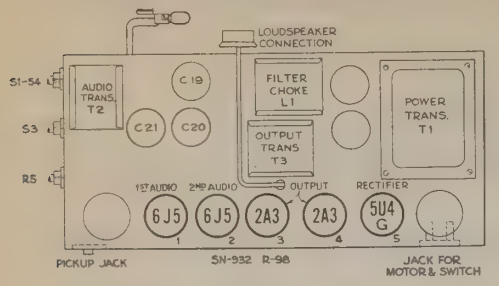
Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	AMPLIFIER ASSEMBLIES
12723	Capacitor—56 mmfd. (C3, C4)
12635	Capacitor—1,000 mmfd. (C15, C16)
31033	Capacitor—1,500 mmfd. (C2)
30303	Capacitor—.0035 mfd. (C7, C14)
4838	Capacitor—.005 mfd. (C6, C17, C18)
5148	Capacitor—.007 mfd. (C13)
4937	Capacitor—.01 mfd. (C5)
32787	Capacitor—.05 mfd. (C9)
14626	Capacitor—.07 mfd. (C1)
12484	Capacitor—0.25 mfd. (C10, C12, C22)
11203	Capacitor—Electrolytic, 10 mfd (C20)
14273	Capacitor—Electrolytic, one 10 mfd., and one 20 mfd. sections (C8, C11)
11496	Capacitor—Electrolytic, 18 mfd. (C21)
14531	Capacitor—Electrolytic, 25 mfd. (C19)
33396	Control—H.F. tone control and switch (S1, S4)
33397	Control—L.F. tone control (S3)
5040	Plug—Speaker cable plug
12466	Reactor—Filter reactor (L1)
12194	Resistor—1,800 ohms, ½ watt (R10)
33482	Resistor—voltage divider, 3,800 ohms (R14)
13714	Resistor—5,600 ohms, ½ watt (R6)
14559	Resistor—10,000 ohms, ½ watt (R2)
12738	Resistor—27,000 ohms, ½ watt (R4)
12266	Resistor—39,000 ohms, ½ watt (R1)
12286	Resistor—56,000 ohms, ½ watt (R12) (R3)
17440	Resistor—56.000 ohms, 1 watt (R11)
14560	Resistor—100,000 ohms, ½ watt (R7)
13734	Resistor—120,000 ohms, ½ watt (R13)
12199	Resistor—270,000 ohms, ½ watt (R8)
12285	Resistor—470,000 ohms, ½ watt (R9)
4794	Socket—Tube socket—4-prong
32537	Socket—Tube socket—8-prong
14275	Socket—2 contact female for motor power
14274	Socket—2 contact female for pickup input
13964	Transformer—Driver transformer (T2)
33405	Transformer—Output transformer (T3)
14271	Transformer—Power transformer, 105-120 volts, 50-60 cycles
33398	Volume Control (R5)
	PICKUP AND ARM ASSEMBLIES
33399	Arm—Pickup arm less crystal cartridge, cable, and base and pivot arm
33400	Base—Pickup arm base and pivot shaft
32885	Cable—Pickup arm cable and plug
31156	Crystal—Pickup crystal cartridge and screw
31160	Screw—Pickup needle screw
	MOTOR ASSEMBLIES
31617	Bracket—Governor end bearing bracket less bearing screw for 50 and 50-60 cycle motors
31619	Coil—Field coils and laminations for 50-60 cycle motor
31618	Coil—Field coils and laminations for 60 cycle motor
11703	Governor—Governor complete for 50-60 cycle motor
31623	Governor—Governor complete for 60 cycle motor
31462	Motor—105-125 volts, 50-60 cycle
31616	Screw—Rotor bearing screw and nut for 60 and 50-60 cycle motor
31620	Screw—Speed regulator screw and nut for 60 and 50-60 cycle motor
31621	Shaft—Turntable spindle and gear for 60 and 50-60 cycle motor
31622	Washer—one felt and one metal thrust washer for turntable spindle
32914	Weight—Governor weight and spring for 50-60 cycle motor
32912	Weight—Governor weight and spring for 60 cycle motor
	AUTOMATIC SWITCH ASSEMBLIES
32863	Cam—Cam assembly comprising main and auxiliary cams, hub, and set screws
32864	Lever—Actuating lever with roller and mercury tube clip
14195	Screw—No. 10-32 x 5/16 cone pointer set screw for cam hub
32869	Screw—No. 10-32 x 5/16 set screw for cam hub
32868	Spring—Actuating lever tension spring
32867	Spring—Cam tension spring
32865	Support—Switch support and terminal board
32866	Switch—Mercury tube with leads (S2)
31608	Washer—"C" washer for actuating lever shaft
	SPEAKER ASSEMBLIES (84613-1)
33648	Cone—Cone assembled with voice coil, center suspension and rim gasket
5039	Plug—4-prong male connector for reproducer
33490	Speaker complete (No Output Transformer)
	MISCELLANEOUS ASSEMBLIES
13103	Cap—Pilot lamp bullseye
33403	Cup—New needle cup
9848	Cup—Used needle cup and pickup arm support
31464	Damper—Turntable damper sleeve and plate
11771	Foot—Cabinet foot
13085	Hinge—Cabinet lid hinge
31355	Knob—Volume control, or tone control knob
33402	Mounting—Motor mounting screws, washers, and spacers
14805	Plug—Plug for motor leads
31155	Spring—Coil spring for used needle cup lid
14270	Spring—Retaining spring for knobs
31164	Support—Cabinet lid support

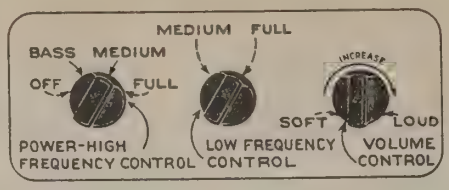
General Description and Service Data

The model R-98 Victrola consists of a crystal pickup, a five tube audio amplifier, a eight inch dust-proof electrodynamic speaker, and a motor turntable mechanism all combined in a hinged-top, table type walnut veneer cabinet. This instrument will reproduce records up to 12-inches in size.

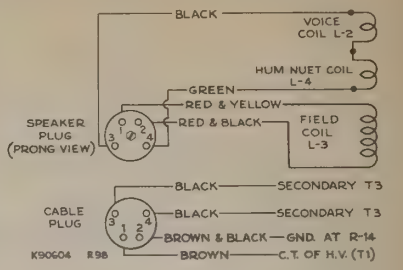
The crystal pickup unit is securely sealed in a metal casing, for protection against extreme changes in atmospheric conditions. If failure occurs, a new replacement crystal unit should be installed.



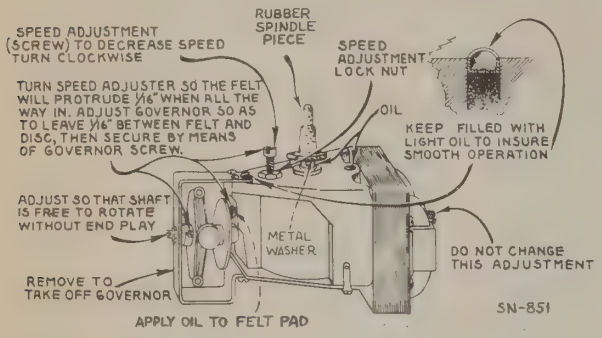
Top View, Showing Location of Parts



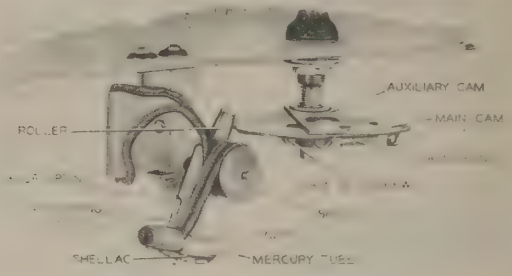
Location of Controls



Connections of Loudspeaker and Cable

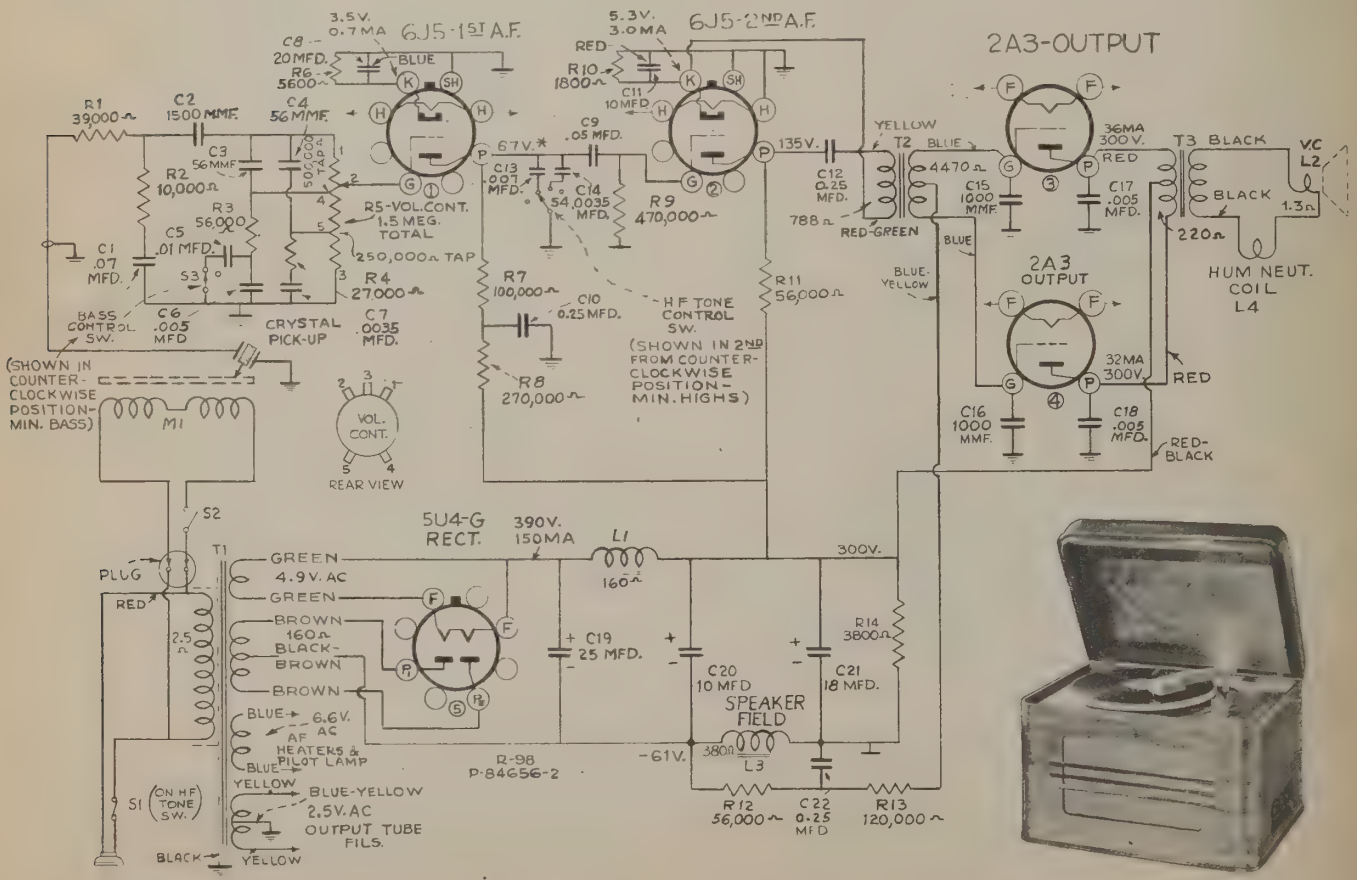

SPEED ADJUSTMENT (SCREW) TO DECREASE SPEED TURN CLOCKWISE
RUBBER SPINDLE PIECE
SPEED ADJUSTMENT LOCK NUT
TURN SPEED ADJUSTER SO THE FELT WILL PROTRUDE 1/16" WHEN ALL THE WAY IN. ADJUST GOVERNOR SO AS TO LEAVE 1/16" BETWEEN FELT AND DISC, THEN SECURE BY MEANS OF GOVERNOR SCREW.
OIL
KEEP FILLED WITH LIGHT OIL TO INSURE SMOOTH OPERATION
ADJUST SO THAT SHAFT IS FREE TO ROTATE WITHOUT END PLAY
METAL WASHER
DO NOT CHANGE THIS ADJUSTMENT
REMOVE TO TAKE OFF GOVERNOR
APPLY OIL TO FELT PAD
SN-851

Motor Lubrication and Adjustments



Mercury Switch Assembly
(Shown with pickup in rest position)

Adjust main cam so that switch trips into the "off" position when needle is 1¾ inches from the center line of motor spindle.



* NOTE: Values with star are operating voltages in circuits with high series-resistance, and when measured will read lower depending on the voltmeter loading.

Measurements made to chassis unless otherwise indicated, volume control at minimum. Values should hold within approximately ± 20% with 117-volt a-c supply.

First Edition

Trademark "Victrola" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

RCA Victor Model R-100 Victrola Attachment

TECHNICAL INFORMATION AND SERVICE DATA

—1939 No. 16—

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical and Mechanical Specifications

MOTOR
78 r.p.m. ..... Synchronous (Manual Starting)
POWER SUPPLY RATINGS
A-6 ..... 105-125 volts, 60 cycles, 10 watts
A-5 ..... 105-125 volts, 50 cycles, 10 watts
B-2 ..... 105-125 volts, 25 cycles, 10 watts

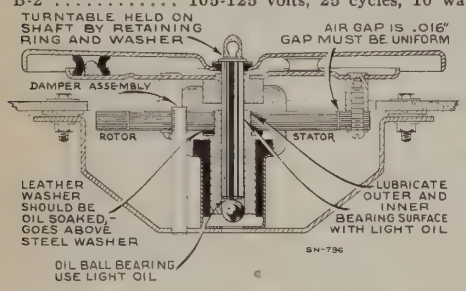
CRYSTAL PICKUP
Impedance..... 100,000 ohms at 1,000 cycles
Average Output Voltage .... 1½ Volts at 1000 cycles across 250,000 ohms load
Cabinet Dimensions ..... 5¼ x 8¼ x 12 inches
Weight ..... 5¾ lbs. (net), 7 lbs (shipping)

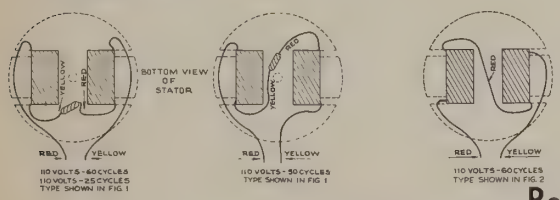
At Left—Fig. 1

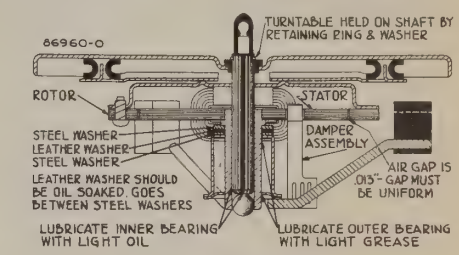
At Right—Fig. 2

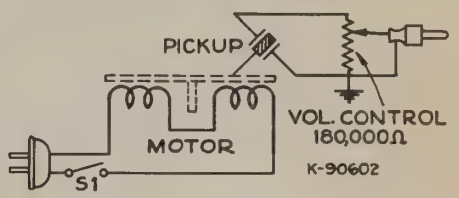
Lower Left—Motor Coil Connections

Lower Right—R-100 Schematic Diagram


TURNTABLE HELD ON SHAFT BY RETAINING RING AND WASHER
AIR GAP IS .016" GAP MUST BE UNIFORM
DAMPER ASSEMBLY
ROTOR
STATOR
LEATHER WASHER SHOULD BE OIL SOAKED, GOES ABOVE STEEL WASHER
LUBRICATE OUTER AND INNER BEARING SURFACE WITH LIGHT OIL
OIL BALL BEARING USE LIGHT OIL
SN-736


YELLOW
RED
BOTTOM VIEW OF STATOR
RED
YELLOW
110 VOLTS-60 CYCLES 110 VOLTS-25 CYCLES TYPE SHOWN IN FIG. 1
110 VOLTS-50 CYCLES TYPE SHOWN IN FIG. 1
110 VOLTS-60 CYCLES TYPE SHOWN IN FIG. 2


86960-0
TURNTABLE HELD ON SHAFT BY RETAINING RING & WASHER
ROTOR
STATOR
STEEL WASHER
LEATHER WASHER
STEEL WASHER
DAMPER ASSEMBLY
LEATHER WASHER SHOULD BE OIL SOAKED. GOES BETWEEN STEEL WASHERS
AIR GAP IS .015"- GAP MUST BE UNIFORM
LUBRICATE INNER BEARING WITH LIGHT OIL
LUBRICATE OUTER BEARING WITH LIGHT GREASE



Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION	
	PICKUP AND ARM ASSEMBLIES		31042	Stator—Stator assembly comprising coils and laminations for 60 cycle operation	
33121	Arm—Pickup arm complete—less crystal cartridge		32076	Turntable—Finished turntable plate only—25 cycle	
33124	Base—Pickup arm base and pivot shaft		31039	Turntable—Finished turntable plate only—50 cycle	
33122	Crystal—Pickup crystal cartridge and needle screw		4083	Washer—Leather washer	
33123	Damper—Viscoloid damper for pickup armature.		33348	Washers—Leather and metal washers for stator bearing	
33529	Screw—Pickup needle screw		14231	Washer—Metal spacing washer	
	MOTOR ASSEMBLIES (see figure 1)		32074	Weight—One upper and one lower weight for stator—25 cycle (2 each required)	
31045	Base—Motor support, damper, and bearing cup assembly			**MOTOR ASSEMBLIES (see figure 2)**	
31046	Bearing—Rotor bearing—50 and 25 cycle		33345	Cap—Turntable spindle cap (rubber) 60 cycle	
33353	Cap—Turntable spindle cap (rubber)		33346	Coil—Motor field coil—105-120 volts, 60 cycle.	
33357	Coil—Motor field coil—105-120 volts, 25 cycle.		31040	Cushion—One set rubber cushion for turntable mounting	
31918	Coil—Motor field coil—105-120 volts, 50 cycle.		33350	Frame—Motor support frame and bearing cup	
31917	Coil—Motor field coil, 105-120 V., 60 cycle		33349	Hanger—Rubber hanger for mounting motor	
31040	Cushion—One seat rubber cushion for turntable mounting		33347	Lamination—Stator laminations and bearing—less field coils—60 cycle	
31047	Cushion—Rubber cushion for rotor bearing		33343	Motor—105-120 volts, 60 cycle	
33941	Frame—Rotor frame and spindle—60 cycle		33041	Ring—Retaining ring and washer for spindle cap	
33641	Lamination—Rotor lamination—60 cycle		33344	Rotor—Rotor frame, laminations, and spindle shaft assembled—60 cycle	
33358	Lamination—Stator laminations—25 cycle		31039	Turntable—Finished turntable plate only—60 cycle	
33354	Lamination—Stator laminations—less coil 50 cycle		33348	Washers—Leather and metal washers for stator bearing	
33355	Motor—105-120 volts, 25 cycle			**MISCELLANEOUS ASSEMBLIES**	
33351	Motor—105-120 volts, 50 cycle		31051	Foot—Cabinet foot	
33940	Motor—105-120 V., 60 cycle		32500	Mounting—Pickup arm mounting comprising one rubber cushion, 1 washer, and 1 snap ring	
32075	Ring—Lead ring for turntable—25 cycle		31048	Plug—2-contact male plugs for output cable	
33041	Ring—Retaining ring and washer for spindle cap		33359	Volume control and switch R1, S1	
33356	Rotor—Rotor frame, laminations, and spindle shaft assembled—25 cycle				
33352	Rotor—Rotor frame, laminations, and spindle shaft assembled—50 cycle				
31036	Rotor—Turntable and rotor lamination for 60 cycle operation				

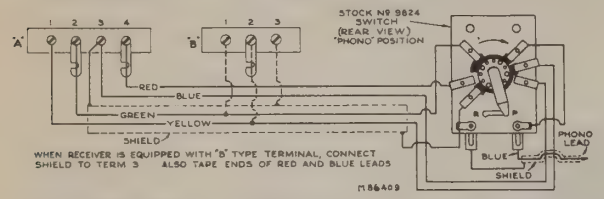
Connecting Victrola Attachment to Radio Receivers

Methods of connecting the Victrola Attachment to various types of audio systems are given in the accompanying text and illustrations. Also included are the model numbers of the various RCA receivers to which the particular method applies. The data given requires that an RCA Stock No. 9824 Radio-Phono switch be used for switching from radio to phonograph, as desired. For ease in connecting the "phono" lead to the Stock No. 9824 switch, the male plug on the end of the lead should be removed by unsoldering or by cutting it off.

1939 RCA Radios of the "90" Series:

Plug male connector on the end of the "phono" lead into the female connector on the receiver chassis. Push or turn the "Phono" switch to "Phono" position, and operate the Victrola Attachment according to instructions.

Radio Receivers Having "Phono" Terminal Boards.



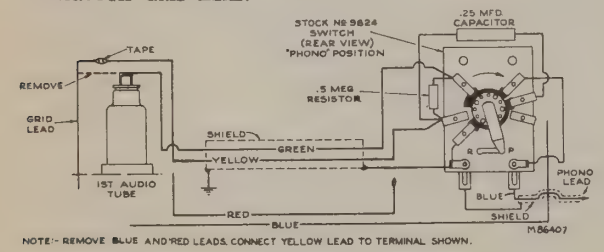
RCA Radio Receivers to which the above illustration applies: 5T1, 5T4, 5T5, 5T6, 5T7, 5T8, 6T5, 8T2, 8T11, 8K11, 85T5, 86E, 86K, 86T, 86T1, 86T4, 86K7, 86T44, 87K, 87T, 87K1, 87K2, 87T2, 88K, 810K, 810K1, 810T, 810T4, 811K, 812K, 813K, 816K, 811T.

For following Receivers, Yellow lead should go on Terminal No. 1, Green lead on Terminal No. 2: 6K2, 6T2, 6K8, 6T10, 7T1, 7K1, 85T8, 86T3, 87T1, 86T2, 86T6, 6K10.

Insulate shield of switch wires from chassis, on following RCA Receivers: 5T, 6T, 6K, 6K1, 7T, 7K, 7X, 8T, 8K, 86X4, 87EY, 87X, 87Y, 8T10, 7X1, 8K1.

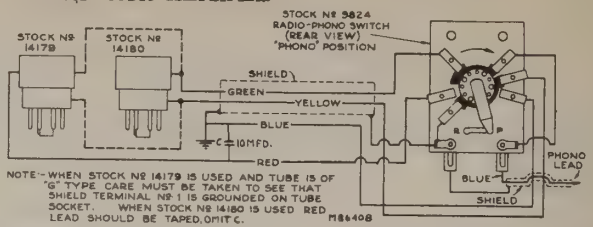
Receivers having a Four Terminal Board: 9K, 9T, 9K1, 9K2, 9K3, 9K10, 10T, 10K, 10K1, 13K, 15K. Reverse Red and Blue leads to Terminal Board of C9-6, T9-9, T8-16, C8-17.

Radio Receivers Whose First Audio Tube is of The Grid Cap Type, and Fixed Bias for Tube is Obtained Through Grid Lead.



In general, the Victrola Attachment must be used with radio receivers having at least two stages of high-gain audio amplification. The output of the Victrola Attachment should be connected to the input of the first audio tube, and at the same time the output of radio receiver portion of the chassis should be shorted or opened, to prevent radio signals being heard while the Victrola Attachment is in operation.

Radio Receivers Using 6C5 or 6J5, 6C5G or 6J5G, Tube For First Audio Amplifier.


STOCK Nº 14179
STOCK Nº 14180
STOCK Nº 9824 RADIO-PHONO SWITCH (REAR VIEW) "PHONO" POSITION
SHIELD
GREEN
YELLOW
BLUE
C = 10MFD.
RED
PHONO LEAD
BLUE
SHIELD
NOTE:- WHEN STOCK Nº 14179 IS USED AND TUBE IS OF "G" TYPE, CARE MUST BE TAKEN TO SEE THAT SHIELD TERMINAL Nº 1 IS GROUNDED ON TUBE SOCKET. WHEN STOCK Nº 14180 IS USED RED LEAD SHOULD BE TAPED, OMIT C.
M86408

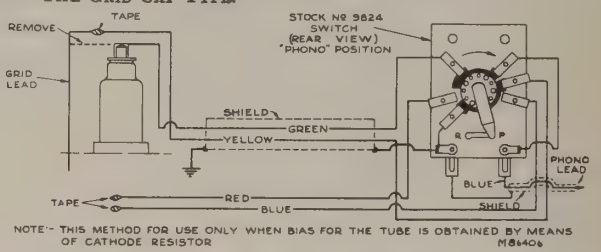
Stock No. 14179 Adaptor opens grid circuit, and inserts 2,700 ohm resistor in cathode of 6C5 or 6J5 tubes, for bias on Phono reproduction.

Stock No. 14180 Adaptor opens grid circuit of 6C5 or 6J5 tube.

Stock No. 14180 Adaptor necessary for RCA: C11-1, C13-2, T10-1, C11-3, C13-3.

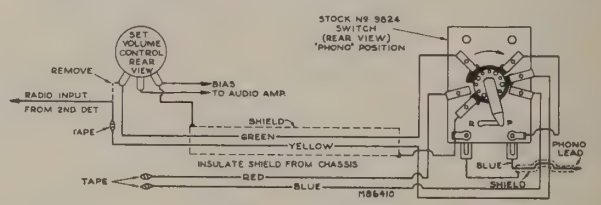
Stock No. 14179 Adaptor necessary for RCA: C15-3, C15-4.

Radio Receivers Whose First Audio Amplifier Tube is of The Grid Cap Type.



RCA Receivers for which above method applies: 125, 128, 128E, 224E, 225, 226, T6-1, C6-2, T6-9, T7-5, C7-6, T7-12, C7-14, T8-14, C8-15, T8-18, C8-19, C8-20, C9-4, T9-10.

Radio Receivers Where the Volume Control is in the Audio Input Circuit.



Motor Data

Smooth starting and running will be insured by keeping the bearings well cleaned and oiled.

Hum and Vibration—A small amount of hum when starting, decreasing to a negligible amount when running, is normal. If excessive vibration occurs, it may be due to:

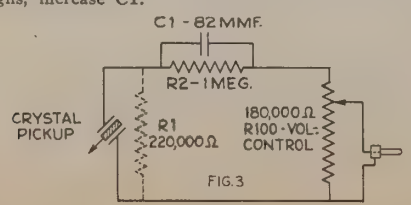
1. Insufficient lubrication, or any failure that will cause binding.
2. Leather washer not oiled. (Check to make sure that the leather and steel washers are arranged in proper sequence, as shown in the drawings.)
3. Motor not properly fastened in cabinet.
4. Burrs on poles of motor or stator.
5. Slight eccentricity of rotor or spindle.
6. Loose laminations of the stator.
7. Improper horizontal alignment of the rotor and stator (pertaining only to the type motor shown in Figure 1). Correct horizontal alignment is as shown in the motor assembly drawing. The position of the stator is raised or lowered by adding or removing washers below the leather washer. In the type motor shown in Figure 2, no adjustment is necessary because correct horizontal alignment is provided by the design of the motor.

The damper spring must fit without binding or chattering, in the slot in the stator. The stator must be free to deflect in either direction between the limits of the damper spring. Any binding in the washers or stator bearing which prevents the movement of the stator may cause speed variations in the motor. The damper spring must exert equal force in restoring the stator to its mid-position when the stator is deflected manually in either direction.

Tone Compensation

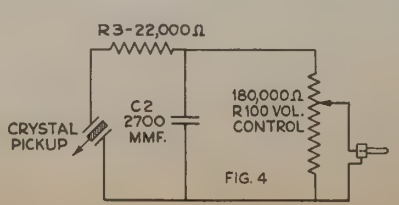
Because of the widely varying frequency characteristics of various types of audio amplifiers with which the R-100 may be used, it may be desirable in some cases to make refinements in the pickup circuit of the R-100 to compensate for the characteristics of the amplifier. The following circuits show means of making such refinements.

In Figure 3, R1 controls the low-frequency response; larger values of R1 give increased lows. For maximum low-frequency response, remove R1. R2 controls pickup output, smaller values of R2 giving increased output. C1 controls high-frequency response; to increase highs, increase C1.



Where a decrease in high-frequency response may be desired (for example, as an aid in reducing "needle scratch" on worn records), the circuit in Figure 4 is applicable. In this circuit, C2 acts as loading on the pickup and is also a controlling factor on the high-frequency response. Smaller values of C2 give more pickup output and also more highs. R3 gives a sharper high-frequency reduction; increasing R3 decreases highs.

The suggested values shown in Figures 3 and 4 should serve as a basis from which slight alterations may be made to suit individual cases.



RCA Victor

RP-139-A and RP-145

Automatic Record Changers

TECHNICAL INFORMATION AND SERVICE DATA

— 1939 No. 41 —

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

The RP-139-A and RP-145 automatic record changers are very similar in design and construction. Most of the parts and adjustments are identical on both. The RP-139-A turntable is driven through a worm gear in the motor housing while the RP-145 turntable is driven through a friction drive disc mounted on the turntable spindle.

On Model RP-145 it is important that the drive motor spindle, and rubber tires on main driving disc and idler pulley be kept clean and free from oil, grease, dirt, or any foreign matter at all times. Any quick-drying naphtha is satisfactory for cleaning these parts. The RP-145 drive motor bearing is lubricated from an oil well filled and sealed at the factory. It should not require lubrication in the field.

The RP-145 turntable is not removable from the spindle. However, the rubber tired driving disc is fastened to the spindle by means of a tapered pin "24." If necessary to remove these parts the tapered pin should first be removed. The driving disc can then be removed from the spindle and the turntable and spindle assembly lifted upward from the motorboard. If this is done, great care should be taken not to bend the spindle. At the same time the spindle bearing should be oiled and the cup and ball thrust bearing oiled and checked for proper position.

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc., are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and revolving the turntable by hand. Six turntable revolutions are required for one change cycle.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

The 10 and 12 inch records must be absolutely flat for smooth operation.

A pickup shorting switch, located under the motorboard, operates when the pickup is moved outward to the pickup rest.

MISCELLANEOUS SERVICE HINTS

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual misadjustments will enable ready adjustment in most cases.

1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A."
2. Needle does not land properly on both 10 and 12 inch records—Make complete adjustments "D" and "E."
3. Needle does not land properly on 12 inch record but correct on 10 inch—Effect adjustment "E."
4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B." Also, see that levers "7" and "12" are free to move without touching each other.
5. Pickup strikes lower record of stack or drags across top record on turntable—Adjust lift cable per adjustment "C."
6. Needle does not track after landing—Friction clutch "5" adjustment "B" may be too tight; bind in tone arm vertical bearing; levers "7" and "12" fouled; or pickup output cable twisted.
7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.
8. Wow in record reproduction—Record is defective; or instrument is not being operated at normal room temperature; on Model RP-145 oil, grease, dirt, or other foreign matter on motor spindle, main driving disc or idler pulley rubber tire. Clean with any quick drying naphtha. Also, on RP-145 the motor support bracket "N" should be moved in its mounting holes until the motor spindle is parallel to the turntable spindle and exactly at right angles to the main driving disc "29." The bracket mounting nuts should then be securely tightened.
9. Record knives strike edge of records—Records warped: record edges are rough; or knife adjustments "F" and "G" are incorrect.
10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H."
11. When playing both types of records mixed and needle either lands in 10 inch position on 12 inch record or misses record entirely—Increase tension of mixed record discriminating lever spring "M."

First Edition

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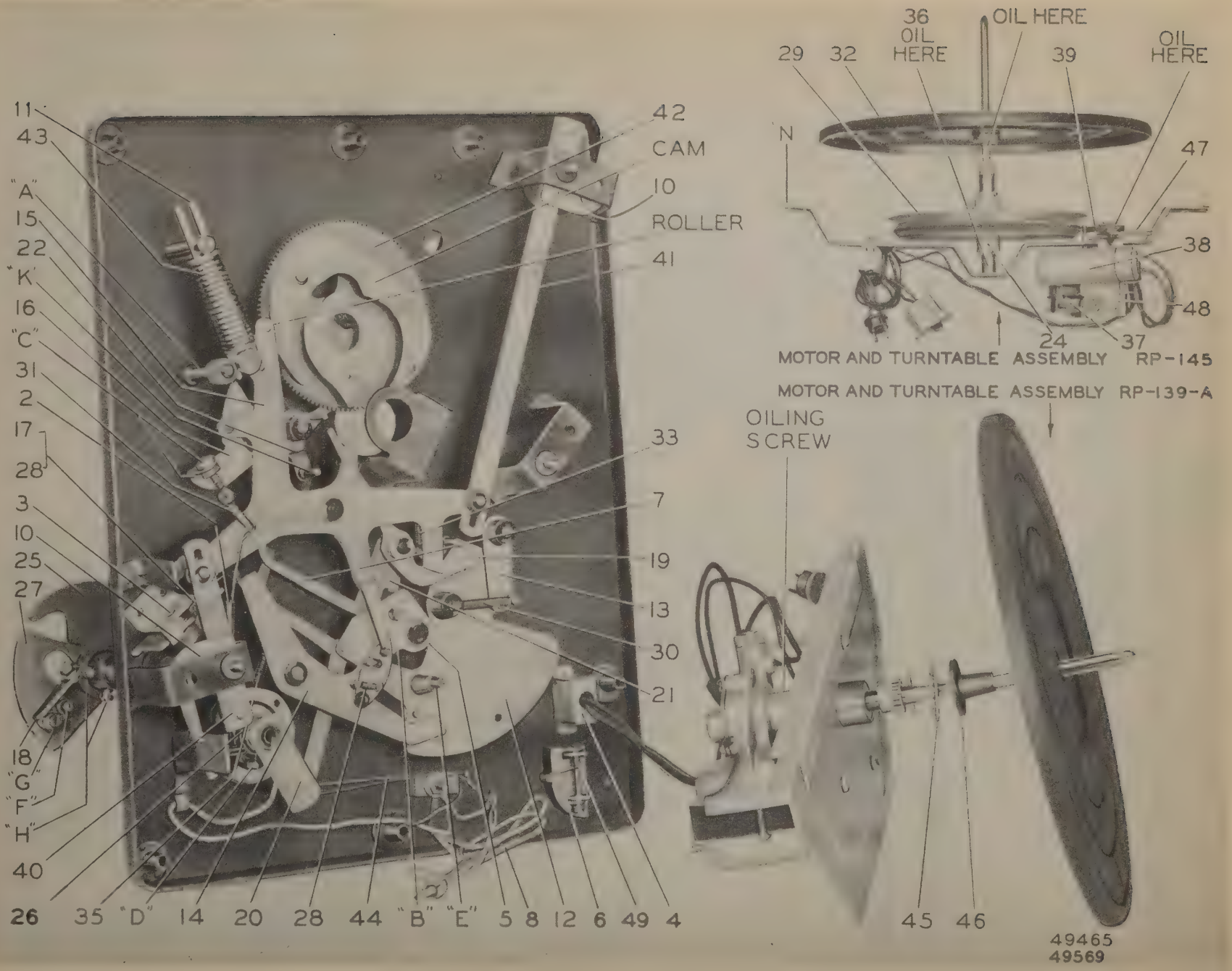
Printed in U. S. A.


11
43
"A"
15
22
"K"
16
"C"
31
2
17
28
3
10
25
27
18
"G"
"F"
"H"
40
26
35
"D"
14
20
28
44
"B"
"E"
5
8
12
6
49
4
42
CAM
10
ROLLER
41
33
7
19
13
30
21
36
OIL
HERE
OIL HERE
29
32
39
OIL
HERE
N
47
38
48
24
37
MOTOR AND TURNTABLE ASSEMBLY RP-145
MOTOR AND TURNTABLE ASSEMBLY RP-139-A
OILING
SCREW
45
46
49465
49569

ADJUSTMENTS

A. Main Lever.—This lever is basically important in that it interlinks the various individual mechanisms which control needle landing, tripping, record separation, etc. Rotate the turntable until the changer is out-of-cycle; and check rubber bumper bracket (A). The roller should clear the nose of the cam plate by approximately 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the record is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pickup is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the trip finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight. the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.

C. Pickup Lift Cable Screw.—During the record change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pickup lift cable. To adjust pickup for proper elevation, stop the changer "in-cycle" at the point where pickup is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknuts "C" to obtain 1 inch spacing between needle point and turntable top surface.

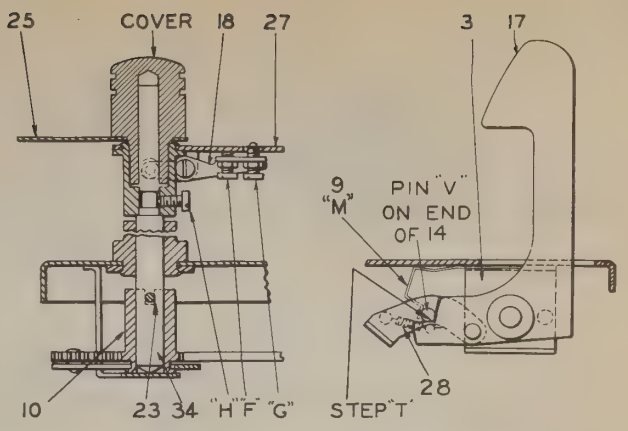
D. & E. Needle Landing on Record. — The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10 inch record. Position of eccentric stud "E" governs the landing of the needle on a 12 inch record; this, however, is dependent on the proper 10 inch adjustment.

To adjust for needle landing, place 10 inch record on turntable; push index lever to reject position and return to the 10 inch position; see that pickup locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on the record; then see that pin "V" on lever "14" is in contact with "Step T" on lever "17." The correct point of landing is 4⅝ inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17." Leave approximately 1/32 inch end play between hub of lever "20" and pickup base bearing, and tighten the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone pointed screw "D."

After adjusting for needle landing on a 10 inch record. place 12 inch record on turntable; push index lever to reject and return to 12 inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5⅝ inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be toward the rear of the motorboard, otherwise incorrect landing may occur with 10 inch records.

F. & G. Record Separating Knife. — The upper plate (knife) "25" on each of the record posts serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "27" be accurately maintained. The spacing for the 10 inch record is nominally .055 inch, and for the 12 inch record is .075 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "F" to give .052—.058 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F," adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072—.078 inch.



H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustment be such that the record is released from both shelves at the same instant. To adjust, place a 12 inch record on the turntable, rotate mechanism into cycle to the point where both separating knives have turned clockwise as far as the mechanism will turn them; lift record upward until it is in contact with both separating knives. Then loosen screws "H" and shift record shelves "27" so that the curved inner edges of the shelves are uniformly spaced approximately 1/16 inch from the record edge. Some backlash will be present in the rotation of these shelves. They should be adjusted so that the backlash permits them to move away from the record but not closer than the approximate 1/16 inch specified above. Tighten the blunt nose screw "H," run mechanism through cycle several times to check action, then tighten cone pointed screw "H."

If record shelves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown). — When the changer is out-of-cycle, the front lower edge of the pickup head should be 5/16 inch above surface of motorboard: This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

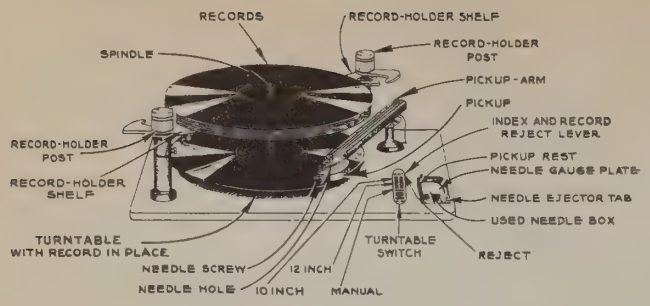
K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication.—Petrolatum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers and pulleys on underside of motorboard. The turntable spindle bearing of RP-145 must be lubricated from the top of the motorboard. Using an oil can with a long spout, reach in between the turntable and motorboard and apply oil directly to the spindle.

On Model RP-139-A apply a few drops of light machine oil (S.A.E.-10) to the motor oil hole adjacent to the spindle bearing after each 1,000 hours of operation. The oil hole has a screw plug.

Do not allow oil or grease to come in contact with rubber mounting of tone arm base, rubber bumper, rubber spindle cap, or rubber parts of friction drive mechanism of Model RP-145.



These record changers are available for operation on voltages and frequencies as follows:

RP-139-A	105-125 volts, 60 cycles, 21 watts
RP-139-A	105-125 volts, 50 cycles, 21 watts
RP-139-A	105-125 volts, 25 cycles, 22 watts
RP-145	105-125 volts, 60 cycles, 15 watts
RP-145	105-125 volts, 50 cycles, 15 watts

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
	PICKUP ARM ASSEMBLIES
33906	Arm—Pickup arm shell
33977	Cable—Pickup shielded cable (8)
35171	Crystal—Pickup cartridge and needle screw
33976	Pin—Used to fasten pivot arm in pickup arm shell
33974	Screw—Needle screw
33975	Shaft—Pickup pivot shaft and pivot arm
	MOTOR ASSEMBLIES (Model RP-139A)
32956	Coil—Field coil and laminations for 25 cycle motor
32955	Coil—Field coil and laminations for 50 cycle motor
32954	Coil—Field coil and laminations for 60 cycle motor
32960	Gear—Motor spindle gear and pin
32873	Motor—Motor complete, 25 cycle, 110 volt AC
32872	Motor—Motor complete, 50 cycle, 110 volt AC
32871	Motor—Motor complete, 60 cycle, 110 volt AC
30870	Plug—2-prong male plug—used on motor leads
32959	Spindle—Turntable spindle complete with metal pinion and fibre gear for 25 cycle motor
32958	Spindle—Turntable spindle complete with metal pinion and fibre gear for 50 cycle motor
32957	Spindle—Turntable spindle complete with metal pinion and fibre gear for 60 cycle motor
32875	Switch—Motor control switch (4)
	MOTOR ASSEMBLIES (Model RP-145)
34513	Armature—Complete armature and shaft for 60 cycle motor
34512	Cap—Bakelite cap for motor
34365	Capacitor—1.25 mfd., for 60 cycle motor (38)
34364	Motor—105/125 volts, 60 cycle, complete with capacitor (37)
30870	Plug—2-prong male plug for motor leads
	MOTORBOARD ASSEMBLIES (Model RP-139A)
33981	Base—Pickup arm mounting base
33978	Board—Motorboard complete with bearings and posts less operating mechanism
33909	Cup—Used needle cup, lid, and pickup arm rest (6)
33979	Escutcheon—Index escutcheon
31150	Mounting—Pickup arm base rubber mounting complete
31155	Spring—Used needle cup lid spring (49)
	MOTORBOARD ASSEMBLIES (Model RP-145)
33981	Base—Pickup arm mounting base
34363	Board—Motorboard complete with bearings and posts—less operating mechanisms
33909	Cup—Used cup, lid, and pickup arm rest (6)
33979	Escutcheon—Index escutcheon
31150	Mounting—Pickup arm base rubber mounting complete
31155	Spring—Used needle cup lid spring (49)
32875	Switch—Motor switch (4)

STOCK No.	DESCRIPTION
	OPERATING MECHANISM
10129	Ball—Steel ball for turntable bearing (Model RP-145)
33984	Bracket—Record discriminating lever mounting bracket (3)
33987	Cam—Cam and drive gear (42)
6808	Clutch—Trip lever clutch (5)
34369	Cup—Turntable bearing cup (Model RP-145) (36)
32883	Damper—Rubber drive sleeve and damper plate for motor spindle (Model RP-139A) (45, 46)
34367	Disc—Turntable drive disc and tire (Model RP-145) (29)
31116	Finger—Trip lever friction finger (7)
32879	Gear—Long arm and rack gear (41)
31121	Gear—Record separator shaft gear (10)
32880	Gear—Short arm and rack gear (40)
34368	Grommet—Rubber grommet for motor mounting (Model RP-145) (48)
31151	Guide—Lift cable guide spring (2)
33982	Guide—Main spring guide (11)
34370	Idler—Turntable idler wheel and arm (Model RP-145) (39)
33986	Lever—Index lever (12)
31138	Lever—Locating lever and pawl (14)
33985	Lever—Main lever (15)
33993	Lever—10-inch and 12-inch record discriminating lever (17)
31140	Lever—Pickup lift cable lever and spring (16)
31130	Lever—Record separator elevating lever with adjustment screws (18)
31132	Lever—Trip detaining lever (19)
34874	Lever—Trip lever assembly (20)
31131	Lever—Trip regulator lever (21)
33992	Link—Index lever setting link and button
31137	Pawl—Index lever pawl (13)
31133	Pawl—Trip pawl assembly (22)
31124	Pin—Pin to fasten gear on record separator shaft (23)
31118	Screw—Cone pointed set screw for record separator shelf ("H")
14195	Screw—No. 10-32 cone pointed set screw for trip lever hub ("D")
33983	Screw—Record separator elevating lever pivot screw
31117	Screw—Special to adjust friction clutch
33990	Separator—Record separator knife (25)
33988	Shaft—Record separator shaft (34)
33989	Shelf—Record separator shelf (27)
3676	Spring—Cam gear pawl spring
31136	Spring—Index lever pawl spring (30)
3666	Spring—Lift cable spring (31)
32436	Spring—Locating lever spring (35)
32882	Spring—Main lever tension spring (43)
34876	Spring—Pickup arm starting spring (26)
14190	Spring—Record discriminating lever pawl spring or locating lever pawl spring (28)
33994	Spring—Record discriminating lever spring (flat) (9)
14191	Spring—Trip detaining lever spring (33)
34372	Spring—Turntable idler wheel spring (Model RP-145) (47)
34371	Support—Turntable drive and motor support (Model RP-145)
34875	Switch—Pickup shorting switch (44)
33991	Turntable—(Model RP-139A)
34366	Turntable and Spindle Shaft—(Model RP-145) (32)
34373	Washer—"C" washer for mounting idler wheel and arm (Model RP-145)

RCA Victor

GOVERNOR MOTORS

Used in

Models U-125, U-126, U-130, U-132, U-134, U-103, U-105, U-124, R-98, Etc.

TECHNICAL INFORMATION AND SERVICE DATA

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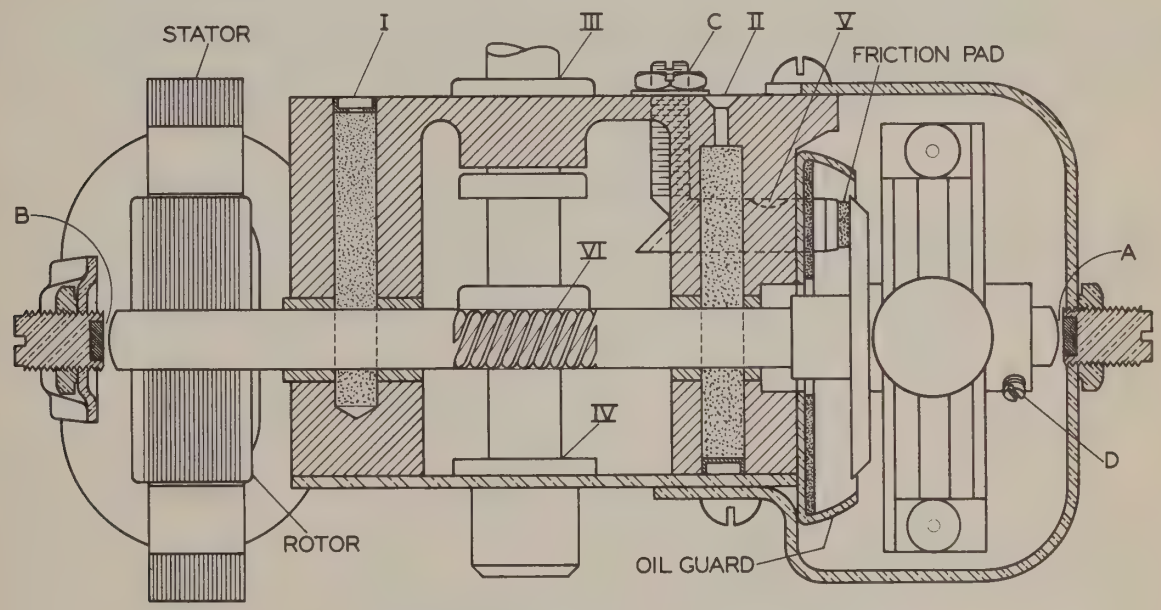

Lubrication and Adjustment

To assure normal and satisfactory operation, every motor requiring service should be lubricated and adjusted as follows:—

(1) Remove motor end brackets, bottom cover containing lower spindle bearing, and governor. Slide vertical spindle downward, remove C-washer; then push upward to disengage worm gear. Slide rotor and shaft from motor.

(2) Clean rotor bearings and rotor shaft thoroughly with "Carbona" or "benzine." Flush oil reservoirs I and II with the same solvent, preferably after removing oil wicks.

(3) Remove governor felt friction pad V. Replace this pad with revised type Stock No. 34058, being certain to saturate thoroughly with oil.

(4) Put slight amount of oil in each rotor bearing, and reinsert rotor shaft. See that shaft revolves freely when in position.

(5) Oil bearing IV, grease gear VI, and re-install bottom cover; checking to assure that vertical spindle revolves freely and worm is properly meshed after cover is in place and screws tightened. Do not misplace small disc of bottom thrust bearing.

(6) Inspect governor to see that springs move freely under retaining washers, and that governor is otherwise in good condition. Install on rotor shaft, checking for possible bind of sleeve on the shaft.

(7) Replace end brackets containing thrust screws "A" and "B".

(8) Adjust thrust screw "A" so that **one** steel lamination of rotor shows beyond the stator laminations as illustrated. This positions rotor at the electrical center of the stator, for maximum torque.

(9) Adjust thrust screw "B" to provide 1/16 inch clearance from end of rotor shaft.

(10) Fill both wells I and II with oil. At least 30-50 drops are required. Also oil bearing III.

(11) Position governor so that when it is fully contracted (closed), the friction disc is aligned with outer edge of oil guard. Tighten set screw "D".

(12) Connect motor to source of power, and adjust screw "C" to give 78 R.P.M. After allowing motor to run a short time, to compress felt pad. It may be necessary to recheck position of governor to give sufficient range of speed adjustment.

(13) Test motor, after allowing it to reach operating temperature, by grasping spindle and noting relative amount of force required to cause governor to contract. Also stall motor, and release, to see that governor has "snappy" response.

Special Notes

(1) Do not interchange parts of different motors, especially bearings, shafts, or gears.

(2) Where a new rotor or turntable spindle is installed, allow motor to run-in for eight hours; preferably under load.

(3) The motor should not be tested or used at temperatures below 65 degrees Fahrenheit.

(4) Where thrust bearing screw "A" is badly worn or does not have a fibre insert, replace with RCA Stock No. 31616.

(5) Governor motors should be thoroughly lubricated after approximately 300-500 hours of operation. This is equivalent to 1-2 years usage in the average home.

Lubricant Specifications

Only **mineral** base oils and greases should be used.

(1) For points requiring oil, use a type having a high viscosity index (with a viscosity rating of SAE 20-30), such as "Esso Motor Oil, Uniflo No. 3."

(2) For points requiring grease, a light gear grease having good clinging properties, such as "Cities Service No. 7035-A1" or "Koolmotor Universal Trojan No. 1", should be used.

Governor Waver — Causes

Drifting of motor speed at a slow rate, or erratic shift to other than normal speed, is generally caused by (1) binding of rotor or spindle bearings due to lack of lubrication, (2) scored shafts or bearings, (3) binding due to tight adjustment of thrust bearing "B", (4) binding of turntable spindle bearing on motor board (where used), (5) improper centering of motor with respect to turntable spindle.

Governor Chatter — Causes

When the governor rattles or flutters rapidly, accompanied by excessive mechanical noise, the likely source of trouble is (1) glazed felt friction pad due to lack of lubrication, (2) rotor not centrally positioned in stator, (3) thrust bearing "A" worn, (4) mis-aligned or rough governor disc.

Heavy Duty Motor

A heavy duty motor Stock No. 31163 is available for replacement of the Stock No. 31157 type used in Models U125, U126, U128, U132, U134, etc., at a nominal exchange price. The larger motor has a higher torque specification, will operate normally over greater ranges of voltage and frequency, and gives increased life before relubricaton is required.

First Edition

Trademarks "RCA Victor" and "Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.

Printed in U. S. A.

RCA Victor

Magic Wave Antenna, Spider-Web Antenna and Master Antenna

Diagrams and Transformer Connections

TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.
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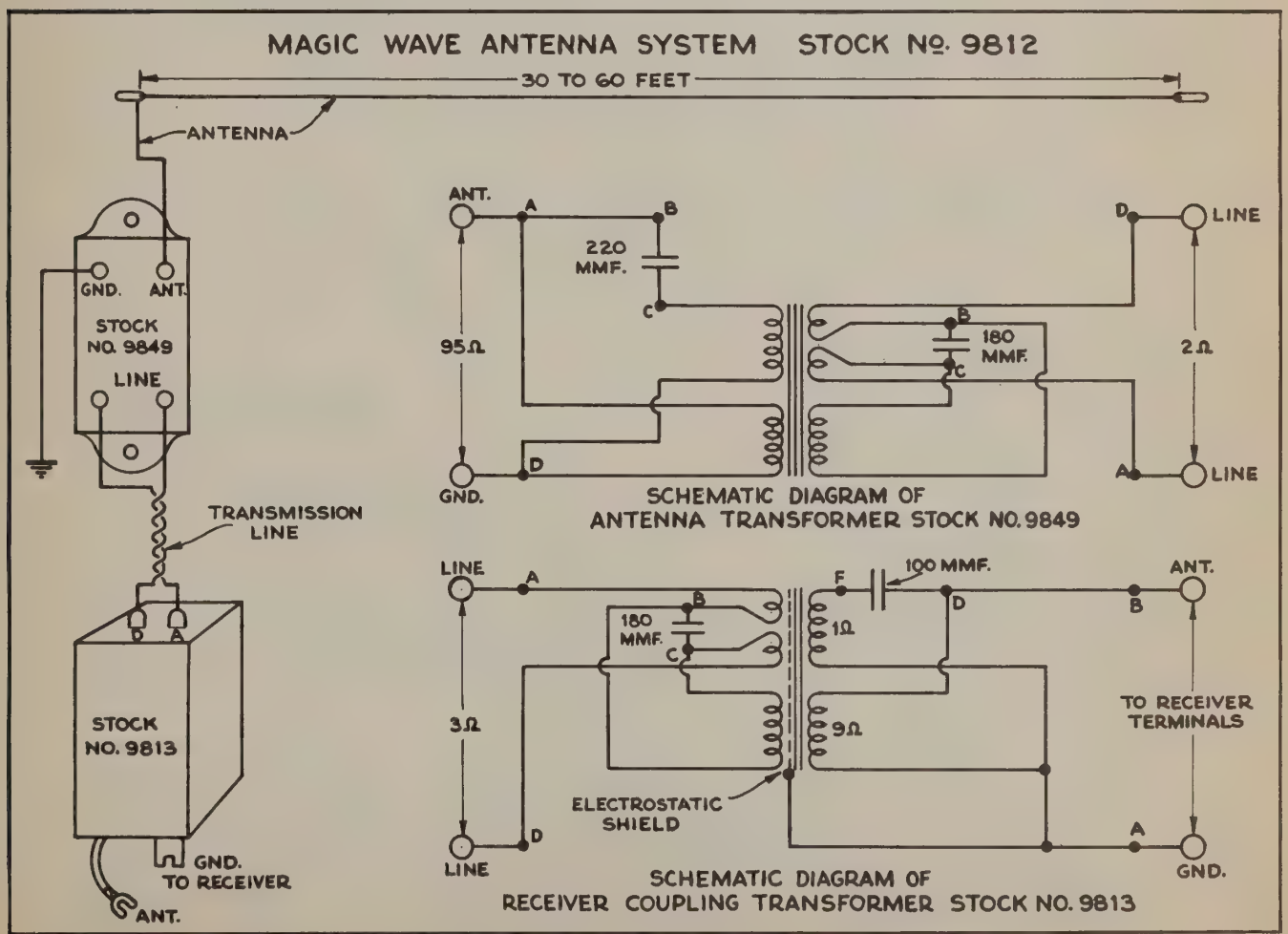

First Edition

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Printed in U. S. A.

MAGIC WAVE ANTENNA WITH DISTRIBUTION TRANSFORMER

METHOD OF USING THE MAGIC WAVE ANTENNA TO FEED UP TO FOUR RECEIVERS THROUGH A STOCK NO. 9814 DISTRIBUTION TRANSFORMER. IF MORE THAN FOUR RECEIVERS ARE TO BE USED, THE ANTENNA SHOULD BE MODIFIED AS SHOWN IN FIG. 2.

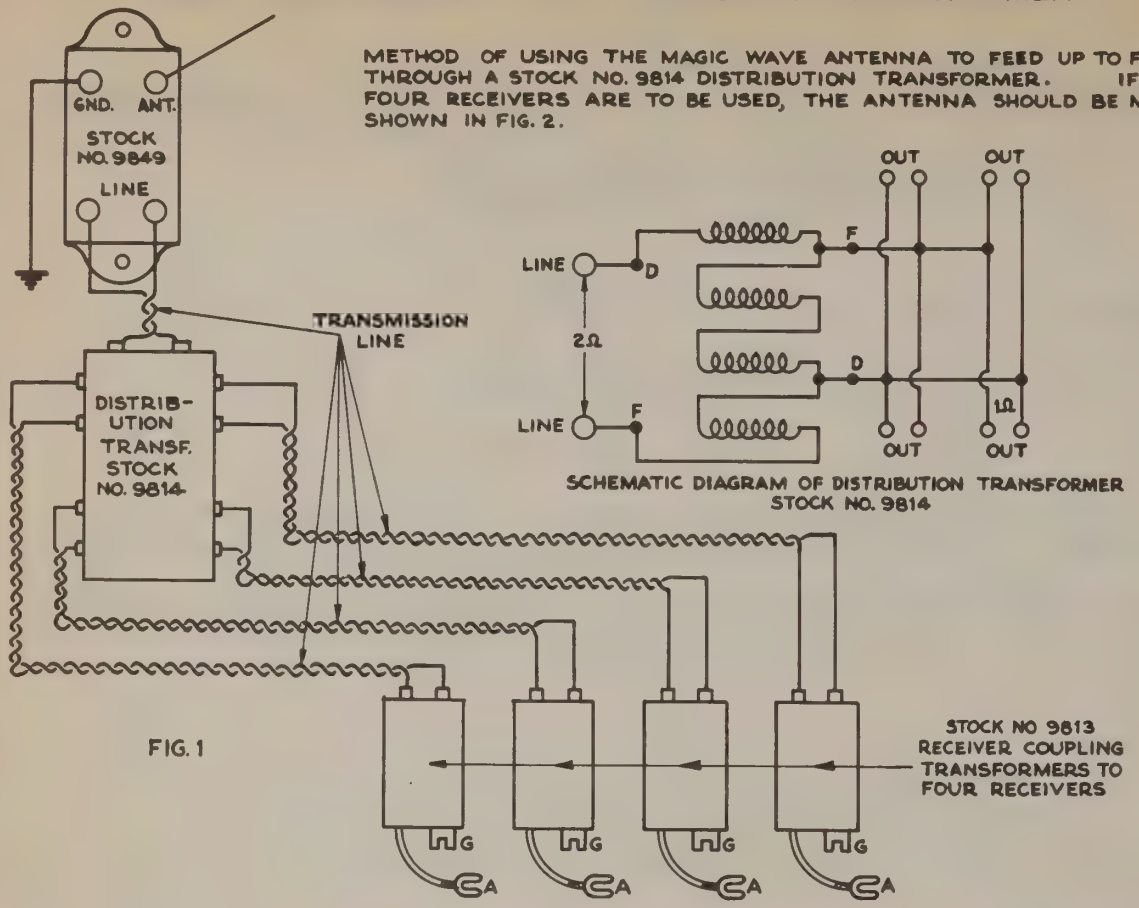
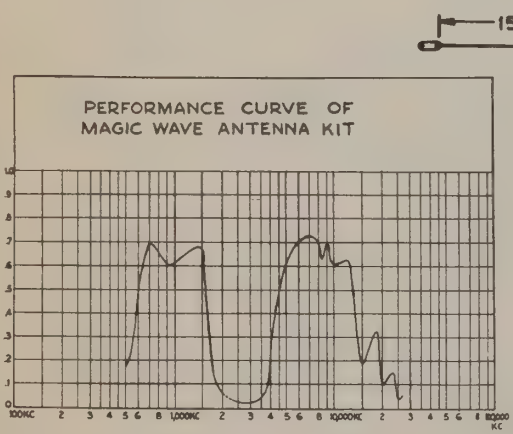
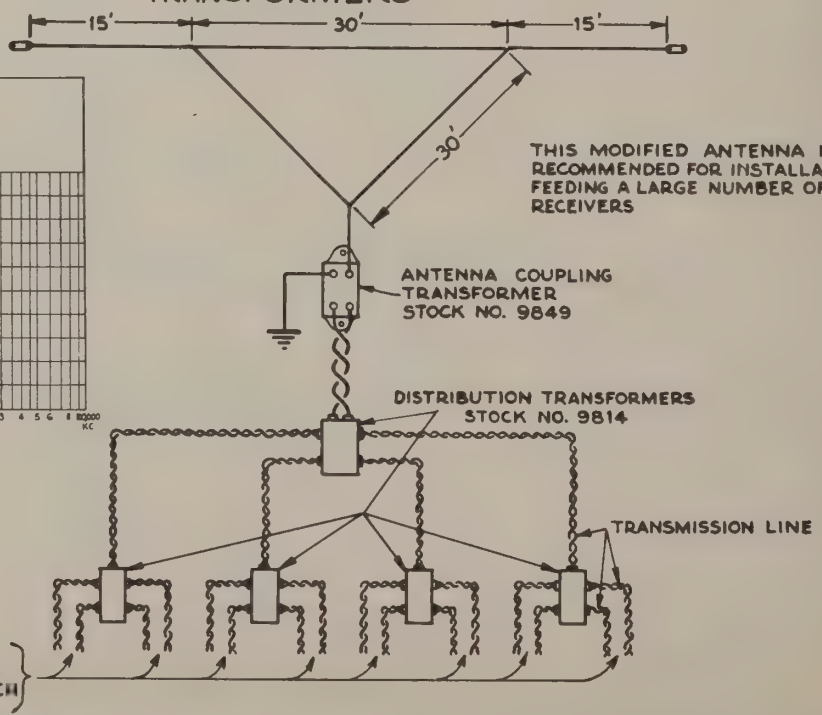


FIG. 1

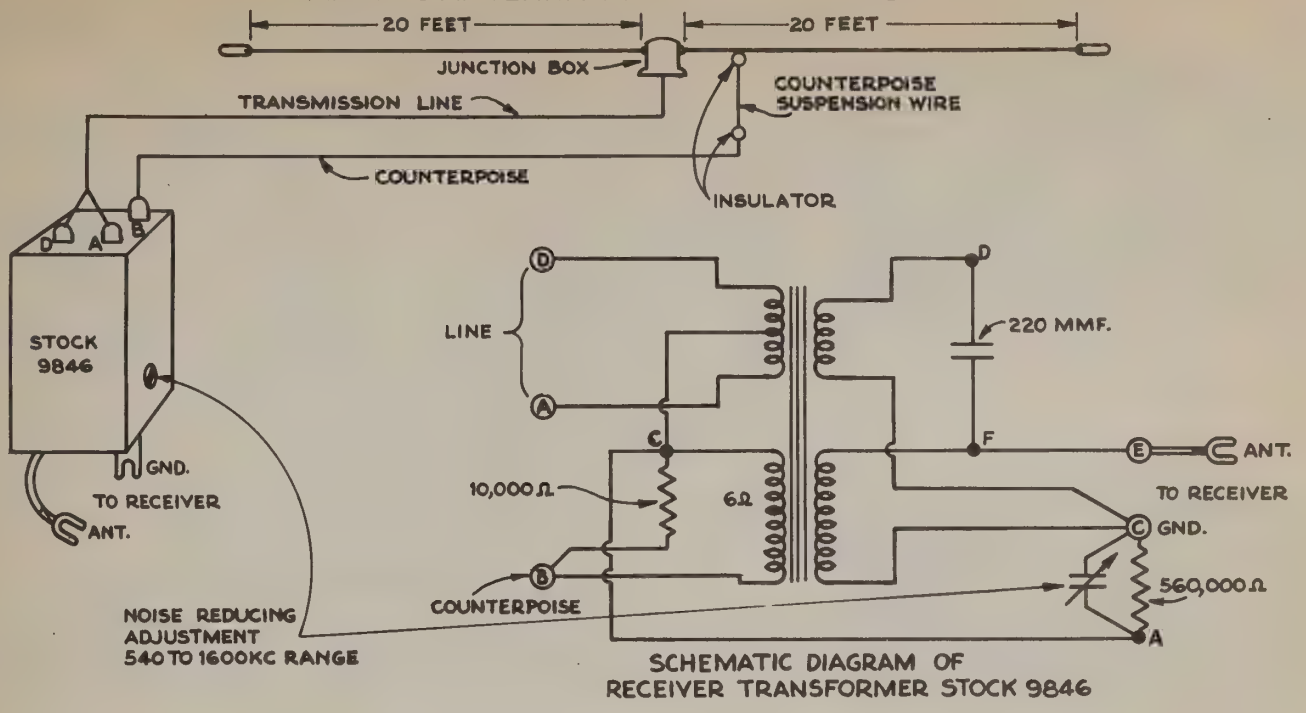
FIG. 2 MODIFIED MAGIC WAVE ANTENNA AS USED WITH 2 TO 5 DISTRIBUTION TRANSFORMERS




15'
30'
15'
30'
THIS MODIFIED ANTENNA IS RECOMMENDED FOR INSTALLATIONS FEEDING A LARGE NUMBER OF RECEIVERS
ANTENNA COUPLING TRANSFORMER STOCK NO. 9849
DISTRIBUTION TRANSFORMERS STOCK NO. 9814
TRANSMISSION LINE
TO RECEIVER COUPLING TRANSFORMERS STOCK NO. 9813 - ONE FOR EACH RECEIVER.

THE ABOVE DIAGRAM SHOWS THE INSTALLATION OF FIVE DISTRIBUTION TRANSFORMERS PROVIDING FOR THE OPERATION OF UP TO SIXTEEN RECEIVERS. TRANSMISSION LINES MAY BE RUN IN METAL CONDUIT IF DESIRED ALTHOUGH THIS IS NOT NECESSARY. TWO OR MORE LINES MAY BE RUN IN THE SAME CONDUIT BUT NOT WITH OTHER ELECTRICAL WIRING.

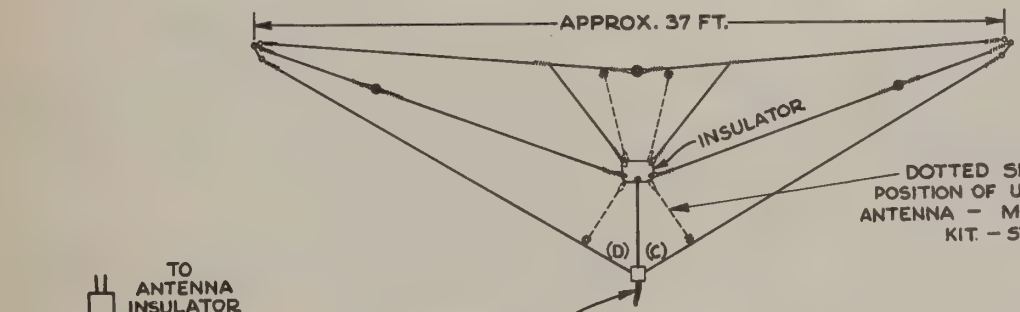
MASTER ANTENNA KIT STOCK Nº. 9845

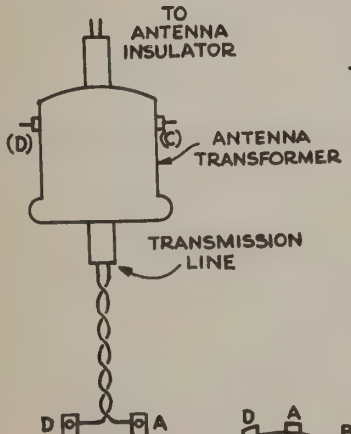


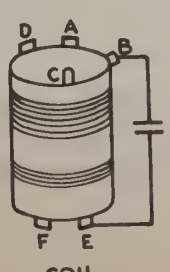
SCHEMATIC DIAGRAM OF RECEIVER TRANSFORMER STOCK 9846

COUNTERPOISE SHOULD BE ONE HALF THE LENGTH OF THE TRANSMISSION LINE PLUS 10 FEET EXAMPLE:- IF THE TRANSMISSION LINE IS 40 FEET LONG, THE COUNTERPOISE WILL BE 20+10 OR 30 FEET LONG.

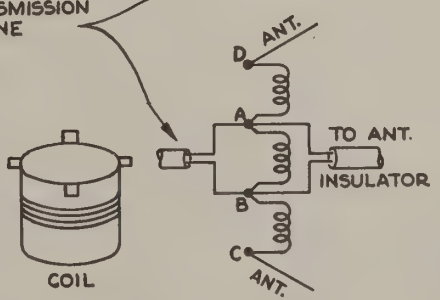
SPIDER-WEB ANTENNA STOCK Nº. 9685



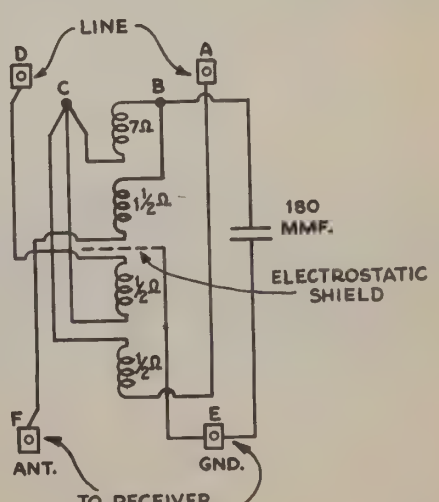




THE EFFECTIVE RANGE OF ANTENNA IS FROM 140 TO 23,000 KC (4 BANDS) THE ULTRA HIGH FREQUENCY BAND (23 TO 70 MC) MAY BE COVERED BY THE ADDITION OF AUXILIARY KIT STOCK NO. 9689



SCHEMATIC DIAGRAM OF ANTENNA TRANSFORMER



SCHEMATIC DIAGRAM OF RECEIVER TRANSFORMER STOCK 12424

No. 9812

IMPROVED MAGIC WAVE ANTENNA

A new highly efficient noise reducing antenna for every type of radio installation.

Here's an antenna that literally has "everything" a radio user requires. Noise reduction over all bands, flexibility in installation and high signal pick-up. In no other RCA antenna can you obtain *all* of the following features:

- Noise reduction of both standard and foreign broadcasting bands (530 to 23,000 k.c.).
- Built-in lightning arrester in antenna coupling unit.
- Operates up to 16 outlets from 1 antenna with additional coupling and distribution transformers (only slight reduction in signal strength).
- Easily installed. Completely assembled and soldered.
- Antenna may be from 20 to 120 feet long.
- Transmission line may be any length up to 500 feet.
- 30-foot length of pipe may be used for vertical antenna with underground transmission line.
- Uses magnetite core transformers.
- Can easily be attached to existing antennas.

$5.95
Stock No. 9812 LIST
(Includes complete assembly for single outlet installation)

Stock No. 9849, Antenna Coupling Transformer with Built-in Lightning Arrestor (*for assembling your own kit*) $2.00

Stock No. 9814, Distribution Transformer $3.00
(1 required for each 4 additional receivers)

Stock No. 9813, Set Coupling Transformer $2.50
(1 required for each additional receiver)

No. 395

395 ANTENNA SYSTEM

At a figure everyone can afford to pay it is a scientifically designed system, operates perfectly with receivers of all types and manufacture and is unusually easy to install. Requires only two supports, 40 feet apart. All parts, including antenna wires, strain insulators, junction box, etc., are assembled and soldered.

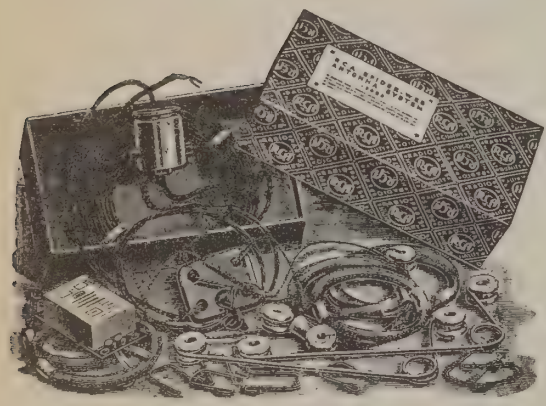
Cash in on this low-priced antenna. Recommend it to your customers who need a quality antenna at a popular price.

CONTENTS OF KIT

- 2 Antenna Wire Coils—Each 20 feet long
- 2 Strain Insulators
- 1 Transmission Line—60 feet
- 1 Junction Box
- 1 Receiver Coupling Unit
- 2 Coupling Unit Links
- 2 Nail-On Knob Insulators
- 1 Ground Clamp
- 1 Instrument Sheet

$3.95
Stock No. 395 LIST

Stock No. 12855, Set Coupling Unit for 395 and RK-40 Antennas. List $.75



No. 9685

SPIDER-WEB ANTENNA

A Transoceanic Communications type antenna for the home. The RCA Spider-Web Antenna System gives excellent signal pick-up over the frequency range from 140 to 23,000 kc. By adding the stock No. 9689 High Frequency Kit, the range is increased to 70,000 kc. with full noise reduction. Complete factory assembling and soldering of all parts makes installation rapid and easy. Proper design requires only a span of 38 feet and a vertical clearance of 12 feet.

This antenna consists of a series of doublet antennas and an improved transmission line which gives the utmost in noise reduction of the signal pick-up over an extremely wide range. It is RCA's finest antenna, especially recommended for amateur and short wave reception.

List Price
$8.95
Stock No. 9685

Stock No. 9689, High Frequency Kit .....List $1.50

No. 9845

RCA VICTOR MASTER ANTENNA

For those difficult installations where extreme local noise cannot be eliminated by the usual noise-reducing antenna, the RCA Victor Master Antenna will often solve the problem. A new unique noise-balancing circuit, which is *individually adjusted* for each installation, gives a high degree of noise reduction, especially when the noise is from near-by electrical devices. This antenna is *not* dependent on location for its noise-reducing qualities.

The frequency range covered is from 540 to 23,000 kcs. including all standard broadcast and foreign short-wave bands.

	List Price
Stock No. 9845 Complete with Receiver Coupling Transformer....	$6.95
Stock No. 9852 (Model MA) less Receiver Coupling Transformer..	5.00
Stock No. 9846 Receiver Coupling Transformer.....	1.95

ADDITIONAL TRANSMISSION LINE

	List Price
Stock No. 9816 60 feet for No. 395, No. 9845, or No. 9852 Antenna	$1.50
Stock No. 11817 75 feet Submarine type for No. 9812 Antenna ...	3.20

ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.

RADIO TUBE TESTER

STOCK NOS. 156-B & 156-C

Power Supply Requirements -
Line Rating . . . . . 100-125 volts, 50/60 cycles
Power Consumption . . . . . 25 watts

Tube Complement -
Rectifier 1 RCA-6J5-G
Pilot Lamp . . . . . 6.3 volt, 0.2 amp., Mazda 51

Mechanical Specifications -
Dimensions . . . . . 13-1/2" long, 8" wide, 5-3/4" high
Weight (net) . . . . . 15 pounds
Finish . . . . . Blue-gray wrinkle lacquer with light metal trim

DESCRIPTION

This radio tube tester is a highly-efficient and sturdy instrument featuring unusual simplicity of operation. By using a new interlocking design, the push buttons are retained or released automatically as required for testing purposes. An easy-reading roll chart affords ready reference to the active buttons and control settings for each type of tube. Connecting guide lines are marked on the panel from the controls to the corresponding columns of the chart. To insure greater precision, the line voltage is indicated continuously for adjustment except during actual measurement.

APPLICATION

Practically every standard type of receiving tube as well as special types including the regulator, ballast, tuning indicator (Magic Eye) and certain cathode-ray oscillograph tubes can be tested for acceptibility with this instrument. The standard RMA emission test is applied to all receiving and similar tubes whereas the regulator tubes, which are gaseous in type, are tested for breakdown voltage. Ballast tubes may be checked for open circuit, and "noisy" welds can be detected readily by means of a pair of phones. In tuning indicators, the visible control range (opening and closing of the "eye") may be noted in addition to emission.

Although the emission of a tube normally is an excellent criterion of performance, sometimes it is not the definite limiting factor. Thus, a tube which tests "poor" may, in rare instances, be perfectly satisfactory for a given application, or the reverse may equally well be true. A knowledge of the operating conditions, therefore, is highly desirable.

INSTALLATION

Upon unpacking this instrument, remove the panel assembly from the case. The panel assembly may be disengaged readily by prying with a screwdriver or similar tool inserted through the two slots at the front and the two holes at the rear after withdrawing the screw located near the center of the back. Remove the cardboard cover from the rectifier tube and make certain that the tube is properly seated and undamaged. Also, inspect the internal connections of the tester in a general manner.

Replace the instrument case and connect the power cord to an electrical outlet supplying 100 to 125 volts at 50 or 60 cycles. Throw the "POWER" switch to the "ON" position and observe the meter deflection which, after a short interval (approximately 15 seconds), will be indicative of the line voltage. Adjust this voltage by means of the "LINE VOLTS" control until the meter reads at the "LINE CHECK" (mid-scale) position.

OPERATION

As noted under "Application", the test procedure will vary with different groups of tubes. Such groups are described separately in the following sections.

RECEIVING TUBES - This group of tubes is by far the largest and embraces the a-c and battery types of detectors and amplifiers, and the various full- and half-wave rectifiers.

1. Rotate the chart to the type number of the tube to be tested and set the "FIL. VOLTS", the "CLASS" and the "TYPE" controls as indicated by the notations in the respective columns of the chart. Follow the guide lines from the chart to the control knobs to insure proper settings.

2. Insert the tube in the proper socket of the tester and attach the grid connector if the tube is equipped with a top contact.

3. Test initially for short-circuited elements by depressing the "SHORTS" button, which will lock in, and then pressing in consecutive order the buttons numbered "1" to "8". If the neon lamp glows steadily, a short-circuit is indicated and the tube should be discarded.

NOTE - On some tubes, the neon lamp should glow when certain buttons are pressed as indicated by the word "SHORTS" printed on the chart opposite such buttons.

4. Assuming that the tube is not short-circuited, proceed to the emission test by depressing the "TEST" button which will lock in and release all other buttons. Now, press the numbered buttons opposite the corresponding numbers found on the chart. Check the line voltage and readjust the "LINE VOLTS" control if necessary. Finally, depress the "OUTPUT" button and observe the condition of the tube on the "GOOD-POOR" scale of the meter. In the case of diodes, any tube which does not cause the pointer to rise to the "DIODES O.K." mark should be rejected.

NOTE - More than one test may be required to determine completely the con-

dition of a tube. For instance, the Type-1A6 will require two tests, one each for the oscillator and converter sections. Similarly, three tests will be employed for the Type-1B5, one for the triode section and one for each diode section. Such multiple tests are given in order on the chart where involved.

5. A test for noise may be made if desired by plugging a pair of phones in the jack located at the lower right-hand corner of the panel and listening for "crackle" while tapping the tube. The "TEST" button should be left depressed during this test.

CAUTION - Incorrect results (low meter readings) will be obtained if the phones are left plugged into the noise jack during emission tests. The error will involve only the output measurement - not the "LINE CHECK".

6. If any doubt still exists as to the tube condition, it will be advisable to repeat the short-circuit test. Excessive leakage may become evident after the tube has been heated over a longer period although the initial test usually will reveal such a defect.

TUNING INDICATOR (MAGIC EYE) TUBES - Certain tubes of this type contain an amplifier section which should be tested for short-circuits and emission in the same manner as for receiving tubes.

To check the indicator section, set the "CLASS" control on position "H", thus reducing the applied potential to 110 volts. This reduced potential is desirable since such tubes often are used under analagous conditions in a-c/d-c receivers. Depress the "TEST" button and the numbered buttons indicated on the chart which will cause the "eye" to appear lighted. The "eye" should operate upon following the instructions printed on the chart directly above the "OUTPUT" button, the latter not being used for this test.

CATHODE-RAY OSCILLOGRAPH TUBES - As shown on the chart, the Types-902 and -913 cathode-ray tubes can be checked with this tester. Its use in testing other tubes of this variety is not recommended.

In testing the Type-902 or the Type-913 tube, allow at least two minutes preheat before checking the emission. The testing procedure is the same as for receiving tubes, rejecting those on which the emission is not sufficient to cause the pointer to rise to the "DIODES O.K." mark.

GASEOUS REGULATOR TUBES - These tubes should be tested initially for short-circuit and then for breakdown voltage.

For the short-circuit test, the procedure is the same as for receiving tubes. Due to the gaseous nature of these tubes, the neon lamp may glow faintly upon pressing button 1 or 3 in testing the Type-874, or upon pressing button 1 or 5 in testing the others. The tube, however, should not be rejected unless the glow is brilliant.

To test for breakdown voltage, depress the "TEST" button and then the numbered button indicated upon the chart. If the tube is good, the meter deflection will rise appreciably, whereas little or no rise will occur if the tube is poor. The "OUTPUT" button is not employed in this test.

BALLAST TUBES - Tubes of this type should be tested initially for open circuit and then for incipient noise due to poor welds. Both tests are performed with the "CLASS" control on position "I" and the "SHORTS" button depressed.

In testing for open circuits, press the numbered buttons indicated upon the chart which in each case should cause the neon lamp to glow. Failure to observe this glow is evidence of a defective tube.

The test for incipient noise is effected by listening for "crackle" through a pair of phones plugged into the jack located in the front right-hand corner of the panel. Defects of this nature usually are the result of poor welds and the noise will be exaggerated by tapping lightly upon the tube envelope.

Common type numbers of these tubes are listed in the left-hand column of the chart in numerical order, while the corresponding Clarostat (tentative RMA) type numbers are given in the right-hand column.

MINIATURE BASE LAMPS - Located between the "LINE VOLTS" and "FIL. VOLTS" Controls, is the socket for testing miniature base lamps. The voltage applied between the contacts is that shown by the setting of the "FIL. VOLTS" Switch.

WARNING - A maximum of 120 volts can be obtained from the contacts of this socket.

SPECIAL RECTIFIERS - Some special rectifiers used for voltage doubling purposes have their plates connected, internally, to their heaters. Normally, on emission tests, the cathode is connected to the heater and the plate is connected through the d-c (Good-Bad) Meter to the high side of the power transformer. However, with these special rectifiers, since the tube effectively has its connections reversed, it is necessary to reverse the meter connections. This is accomplished by depressing both the "SHORTS" and "TEST" buttons simultaneously for the correct "TEST" position. It should be noted that further depression of either the "TEST" or "SHORTS" button will release all other buttons.

CIRCUITS

The circuits used in this instrument are shown on the schematic diagram of Figure 2. As may be observed from this diagram, the design is comparatively simple, consisting fundamentally of the circuit elements described by RMA for standard emission tests.

Adjustment for different plate loads and voltages as required is provided by the "CLASS" control. This control also shifts the filament connections for the octal-base tubes and is equipped with an extra set of switch contacts to avoid obsolescence of the tester in the event of forthcoming new tube types. The "TYPE" control is simply a meter shunt or calibrating potentiometer, while the remaining knobs and buttons are self-explanatory in function.

MAINTENANCE

CAUTION - DISCONNECT THE POWER SUPPLY BY WITHDRAWING THE POWER CORD PLUG BEFORE REMOVING THE INSTRUMENT CASE TO MAKE SERVICE ADJUSTMENTS.

Instructions for removal of the instrument case are given under the section entitled "Installation"

RESISTANCE AND CONTINUITY TESTS - The instrument connection diagram, Figure 3, shows the wiring color codes and the physical relations of the various parts. All resistance and capacitance values are given in addition to the identification symbols for ease of reference to the schematic diagram, photographs, and replacement parts list. The transformer windings are rated in terms of their d-c resistance.

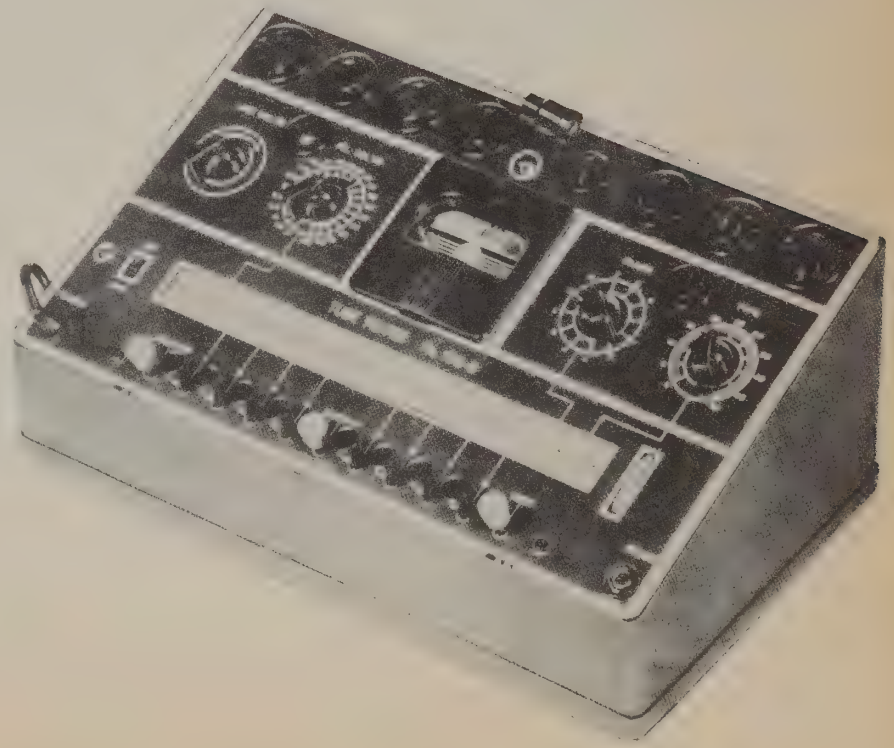
VOLTAGE MEASUREMENTS - The normal operating voltages of the equipment are represented diagramatically in Figure 5. These values should be observed within ±10% when measured with the line voltage adjusted so that the meter reads at the "LINE CHECK" (mid-scale) position. A voltmeter of high internal resistance (at least 1000 ohms per volt) should be employed. All voltages are a.c. (r-m-s) except in the instances noted as "d.c." and are measured from terminal to chassis ground.

CHART REPLACEMENT - To replace the chart, remove one screw which secures the case to the chassis. Then remove the four chart assembly mounting screws and replace the chart according to the instructions printed at the top of the chart.

40-1-3

REPLACEMENT PARTS

Stock No.	Description
32118	Bolt - Suitcase bolt
32120	Button - Push-button (black)
32121	Button - Push-button (red)
32117	Cap - Dual contact cap
4839	Capacitor - 0.1 mfd (C-1)
35298	Chart - Roll chart (tube data)
30925	Handle - Carrying handle
7903	Jack - Phone jack (J-1)
32116	Knob - Control knob
23153	Lamp - Neon glow lamp
32079	Meter
33929	Panel - Control panel
33937	Pilot light jewel
32130	Potentiometer - 50 ohms (R-8)
32131	Potentiometer - 400 ohms (R-1)
32182	Resistor - 24 ohms, 1/4 watt (R-10)
32181	Resistor - 75 ohms, 1/4 watt (R-9)
32179	Resistor - 160 ohms, 1 watt (R-4)
5201	Resistor - 220 ohms, 1/2 watt (R-11, R-12)
30152	Resistor - 1000 ohms, 1 watt (R-5)
32122	Resistor - 3000 ohms, 10 watts (R-7)
3413	Resistor - 5100 ohms, 1/2 watt (R-6, R-13)
32549	Resistor - Matched pair of 134,000-ohm, 1/2-watt resistors (R-16, R-17). Sum = 268,000 ohms ±2%
30651	Resistor - 270,000 ohms, 1/2 watt (R-2)
33932	Socket (Loktal)
33933	Socket (Bantam)
33934	Socket (Lamp test)
35299	Socket (Miniature)
33936	Socket - Pilot light
31251	Socket - Tube socket (octal, for rectifier)
32129	Socket - Tube socket (octal)
32125	Socket - Tube socket (4-prong)
32126	Socket - Tube socket (5-prong)
32127	Socket - Tube socket (6-prong)
32128	Socket - Tube socket (7-prong)
32115	Socket - Neon lamp socket
32132	Spring - Spring for panel contact
33930	Switch - 1-gang, 1-pole, 23-position (S-1)
32123	Switch - 6-gang, 6-pole, 12-position (S-2)
32119	Switch - Single-pole, single-throw (S-3)
33931	Switch - Push-button switch (S-4)
33938	Transformer - Power transformer, XT-3275-A (T-1)



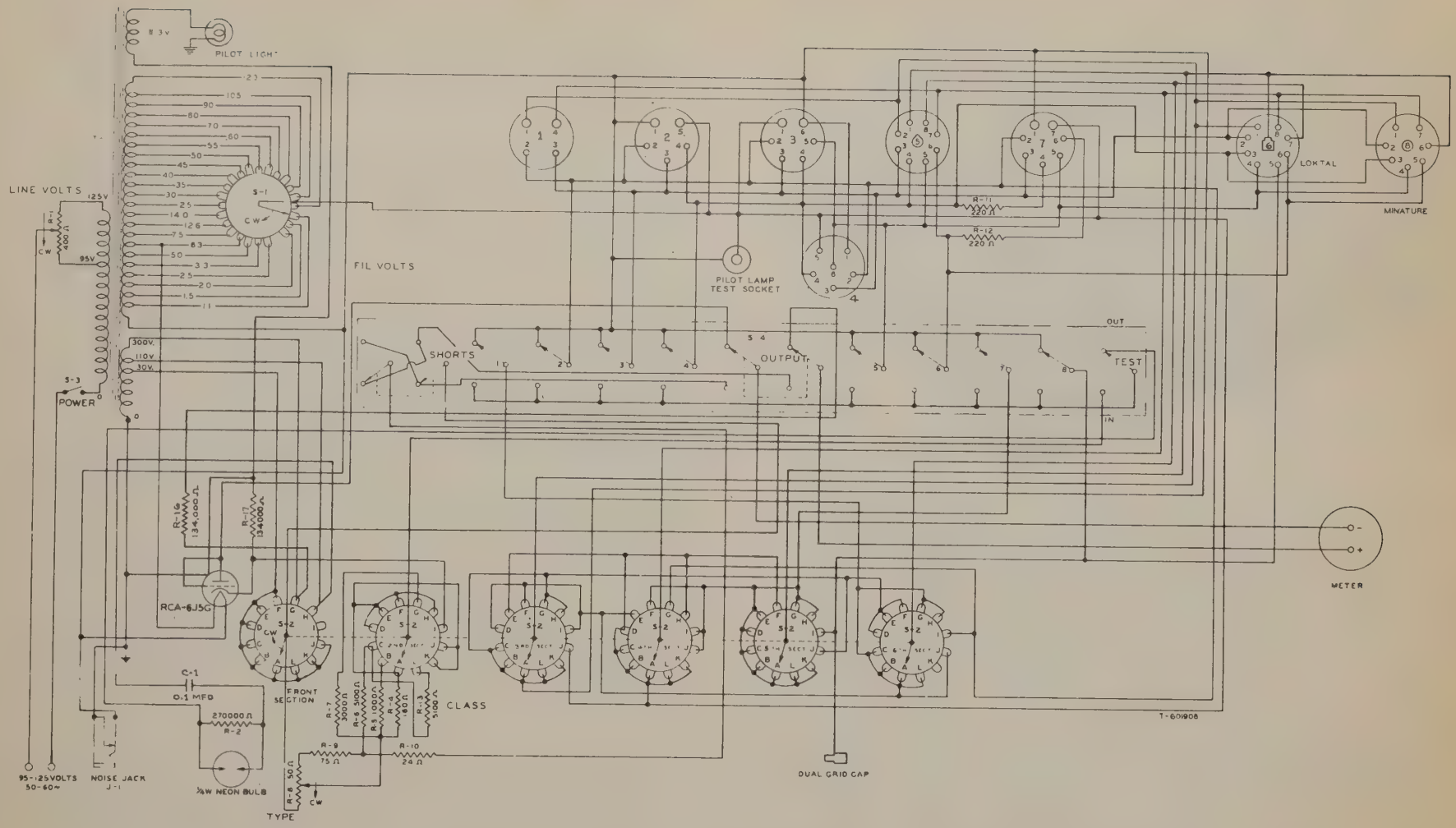


FIGURE 2 - RADIO TUBE TESTER, Schematic

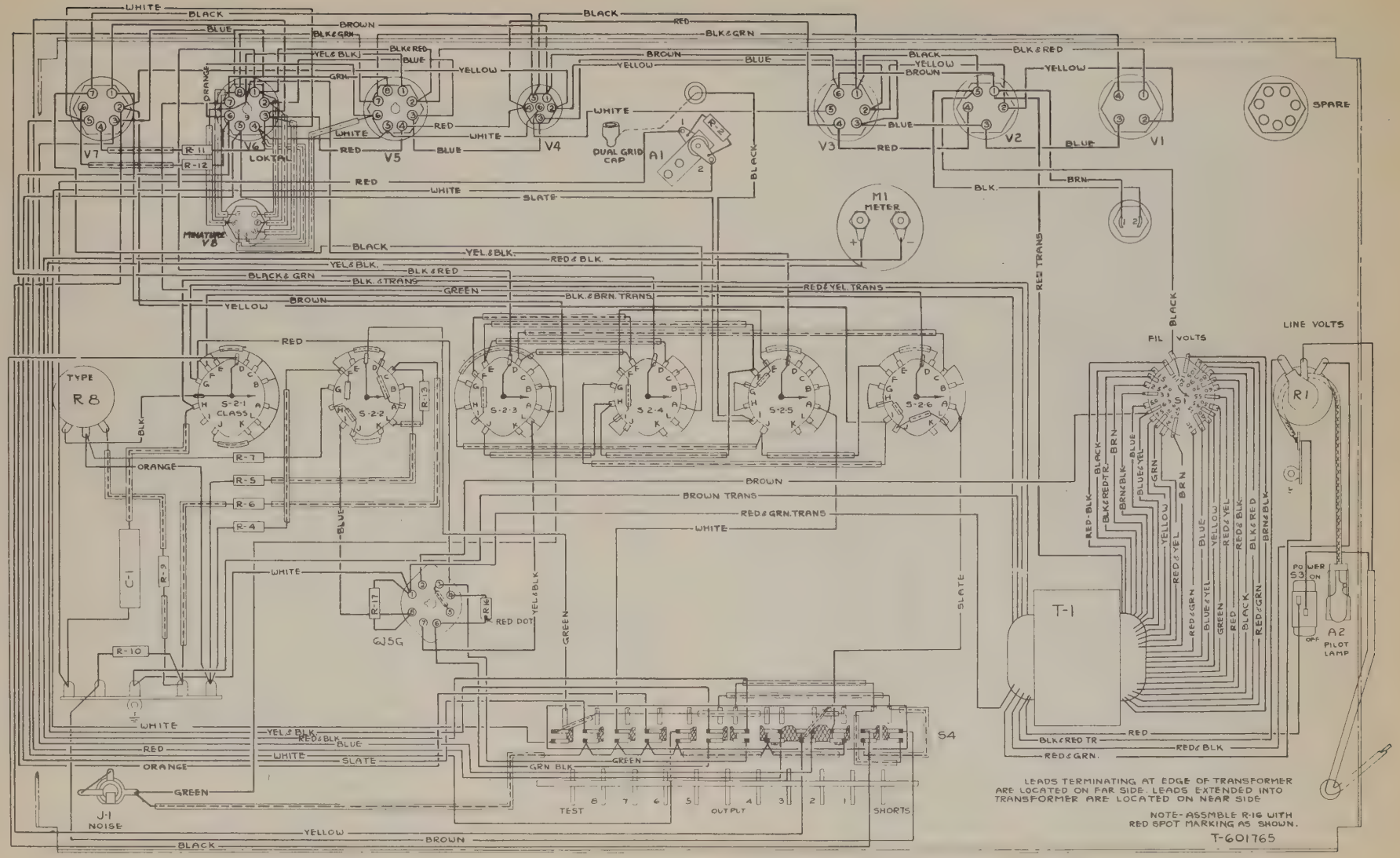


FIGURE 3 - RADIO TUBE TESTER, Connections

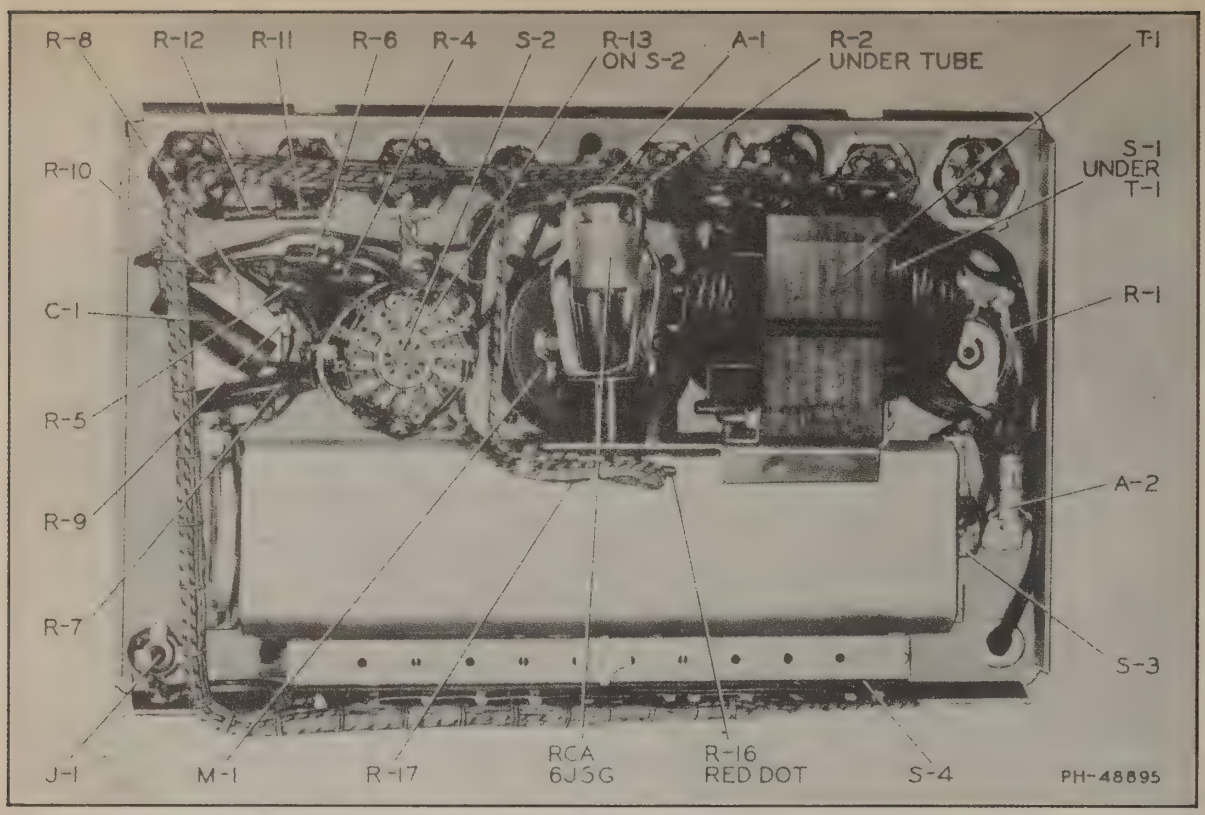


FIGURE 4 - RADIO TUBE TESTER, Chassis Bottom View

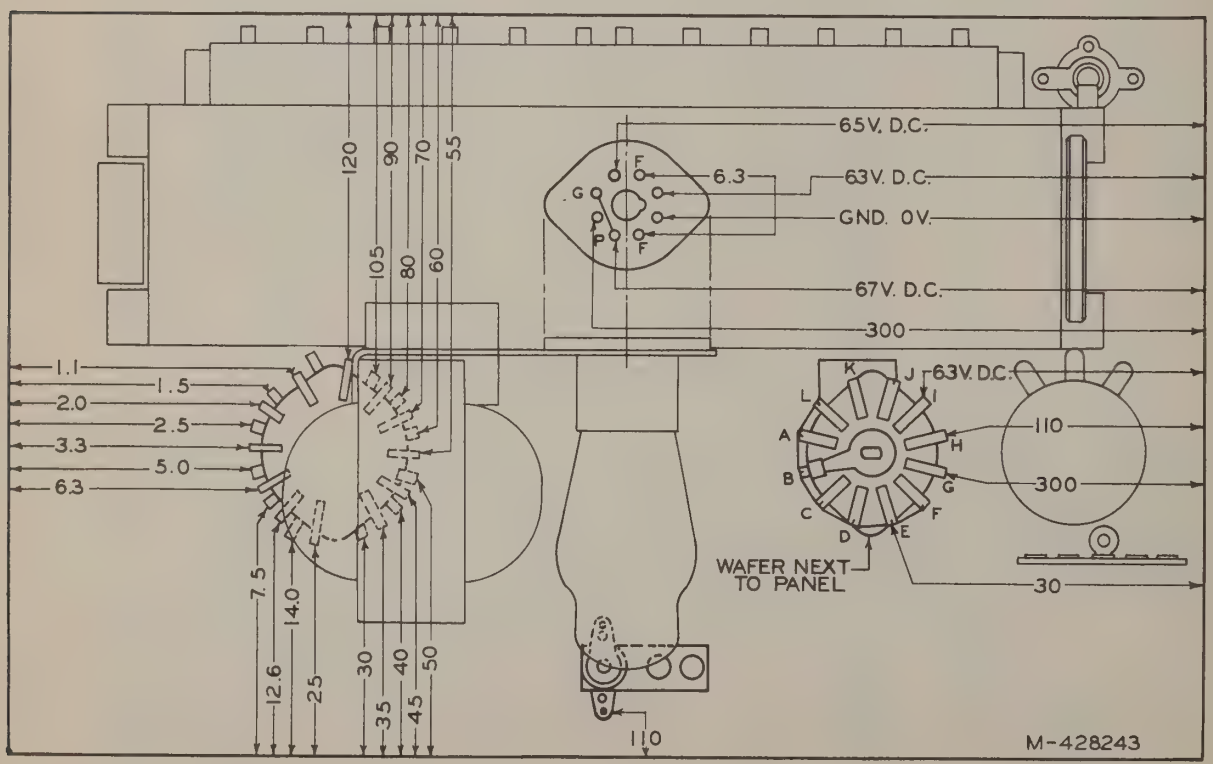


FIGURE 5 - RADIO TUBE TESTER, Voltage Diagram

PIEZO-ELECTRIC CALIBRATOR

STOCK NO. 157

TECHNICAL SUMMARY

ELECTRICAL CHARACTERISTICS -

Fundamental Output Frequencies . . . . . 250 and 2000 kc

Available Test Frequencies -

"LO" Range . . . . . 250 to 25,000 kc in 250-kc steps

"HI" Range . . . . . 2000 to 100,000 kc in 2000-kc steps

Accuracy of Fundamental Frequencies . . . . . ±0.05 percent

Temperature Coefficient . . . . . -10 cycles per 1000 kc per degree C.

Modulation . . . . . Output modulated at power-supply frequency with complete a-c operation. For unmodulated operation, provision is made for connection of 90- to 135-volt d-c plate supply.

Power Supply Requirements . . . . . 110-120 volts, 50-60 cycles, 2 watts
Additional 90- to 135-volt d-c supply required for unmodulated operation

TUBE COMPLEMENT -

Oscillator 1 RCA-955

MECHANICAL SPECIFICATIONS -

Dimensions -

Height . . . . . 5-1/2 inches

Width . . . . . 3-7/8 inches

Depth . . . . . 2-5/8 inches

Weight (net) . . . . . 1 pound, 3 ounces

DESCRIPTION

The Stock No. 157 Piezo-Electric Calibrator is a device for rapidly checking the dial calibration of receivers, test oscillators and signal generators operating within the frequency range of 250 to 100,000 kc.

The test values for any particular calibrations are indicated on the dial scale of the instrument being tested or are of known frequencies. The exact frequency is checked by listening to the note from the calibrator, and the accuracy for all frequencies capable of being tested is that of the piezo electric crystal fundamental, ±0.05 per cent. The method of test is extraordinarily quick, easy and simple as explained later.

The output from the calibrator is in harmonic steps from 250 kc to 25,000 kc in 250-kc steps, and from 2000 kc to 100,000 kc in 2000-kc steps, the former with the lever of the operating toggle switch turned to "LO" and the latter with it turned to "HI".

The instrument operates on 110-120 volt, a-c, 50-60 cycle current, which is used for both heater and plate supply in complete a-c operation, but for heater only in d-c operation. In the former case the plate of the radiotron in the crystal oscillator is supplied with raw a-c potential which gives a 60 cycle modulated r-f output signal for receiver dial calibration work. In the latter case an unmodulated signal results from the d-c voltage applied to the plate.

The calibrator consists of a Piezo-Electric Crystal accurately ground for two modes of oscillation (250 kc and 2000 kc test steps), and a transformer through which a-c power is supplied for energizing the heater element of an RCA-955 acorn type triode and supplying plate voltage in the case of a-c operation. There are three binding-posts on the front of the case, one marked "-", one marked "+", and one unmarked. These are used only for d-c operation. The a-c power cord with plug is attached inside the case to the central unmarked and negative (-) terminals. The central and positive (+) binding-posts must always be connected by a link for a-c operation. For d-c operation this link must be removed. A double-pole double-throw toggle switch, located on the front of the case, selects either of the two output frequency steps. The necessary coils, resistors and capacitors for completing the circuit are as shown in the accompanying illustrations.

IMPORTANT - Always remove link between center and "+" binding-posts before connecting for d-c operation. Be careful to prevent electrical contact between binding-posts and ground, as any one binding-post may be 110 volts above ground according to the way the power cord plug is inserted in outlet.

OPERATION

Before making tests examine the unit by removing the back cover and seeing that the acorn tube is properly inserted in its socket. Replace back cover and proceed in the following manner:

A-C OPERATION - Unwrap power cord and insert plug into 110-120 volt, 50-60 cycle, a-c outlet.

Place instrument in convenient location on flat surface, with back cover down, in close proximity to the instrument to be calibrated (within two or three feet).

Set lever of toggle switch to "LO" for 250 kc steps or "HI" for 2000 kc steps according to the requirements of the test.

Tune the instrument being tested and notes will be heard at frequencies which are multiples of the fundamental being used. If an audible note is not produced by direct radiation, it may be necessary to provide sufficient coupling by connecting a wire to the terminal marked "ant" of the instrument being tested, winding a few turns and laying the coil so formed lengthwise

on top of the calibrator or connecting direct to the output jack. Too much coupling is apt to cause confusion in distinguishing the correct calibration point.

In testing a series of values such as the markings on the dial scale of an "All-Wave" receiver, the operating switch is placed on "LO" for the lower frequencies, and the tuning knob of the receiver turned. At each 250 kc value the calibrator note is heard, and the receiver may be adjusted accordingly. When the note becomes weak, perhaps as the 10,000 kc range is approached, depending on receiver sensitivity and noise level, attach a few feet of wire to the antenna stud of the receiver and wind a coil in the free end for coupling, as explained in the foregoing paragraph or connect direct to the output jack. To check an independent value, such as that of 15,250 kc (FYA, Paris, France), turn the switch to "HI" for 2000 kc steps and locate the 14 mc point. Now, switch to "LO" and count forward to the 15.25 point.

D-C OPERATION - Remove link between center unmarked binding-post and the one on the left marked "+", and attach the leads from the d-c source to the two outside posts marked "+" and "-".

Insert plug on power cord in a-c, 110-120 volt, 50-60 cycle outlet. On grounded systems where d-c line voltage is used for plate potential the grounded side of the two systems must be connected common.

Locate calibrator and proceed as for a-c operation using coupling coil where necessary. The note will be a hiss with the unmodulated d-c excitation.

ADDITIONAL TESTS - Calibration of Test Oscillator or Signal Generator connected to Receiver:

Connect calibrator for either a-c or d-c operation and couple to receiver to give output at required frequency.

Couple Test Oscillator or signal generator to receiver and adjust frequency to give zero beat with calibrator.

Take reading on Test Oscillator or signal generator scale and record any error on calibration chart.

Proceed to make tests in a similar manner for all points desired to be checked.

Calibration of Test Oscillator Alone:

Set Test Oscillator for heterodyne detection.

Locate calibrator using coupling if necessary, and listen with headphones for beat note as frequency is slowly varied. With calibrator on "LO", zero beat should occur at each 250 kc mark.

Record errors as required.

NOTE - It will be found better to make the above tests with calibrator connected for d-c operation.

In calibrating an oscillator such as the Stock No. 153, with receiver, harmonics of the lower oscillator frequencies should be used to beat against harmonics of the calibrator. For example, the tenth harmonic of 350 kc on the oscillator being tested, will give a beat with the 3500 kc signal from the calibrator. Also the 15th harmonic of 370 kc will give a beat with the 5550 kc crystal calibration signal. Interpolation between the 360 and 370 kc point will give a 365 kc point on oscillator when calibrating closer than 10 kc. The following table will serve as a guide in such calibration work. Obviously there are several combinations which may be used. In general it is best to select the lowest oscillator harmonic which will beat with a harmonic from the calibrator.

Oscillator		Calibrator		Receiver
Setting kc	Harmonic used	Fundamental kc	Harmonic used	Setting kc
90	25th	250	9th	2250
100	10th	250	4th	1000
100	20th	2000	1st	2000
100	5th	250	2nd	500
110	50th	250	22nd	5500
120	50th	250	24th	6000
120	50th	2000	3rd	6000
130	50th	250	26th	6500
140	50th	250	28th	7000
150	10th	250	6th	1500
160	50th	2000	4th	8000
170	50th	250	34th	8500
180	50th	250	36th	9000
190	50th	250	38th	9500
200	5th	250	4th	1000
200	10th	2000	1st	2000
210	50th	250	42nd	10,500
:	:	:	:	:
:	:	:	:	:
1000	2nd	2000	1st	2000
1500	1st	250	6th	1500
2000	1st	200	1st	2000

MAINTENANCE

It may be necessary occasionally to replace the radiotron RCA-955, but other troubles should not occur. The crystal is a single unit with two modes of oscillation and so long as the 2000 kc adjusting capacitor is not moved, the two frequencies will maintain their proper relation to each other. After long continued usage if output becomes weak or unit becomes inoperative make a careful check for circuit troubles. Then, finally, if necessary, remove and clean the crystal. This is done by removing the three nuts from the studs

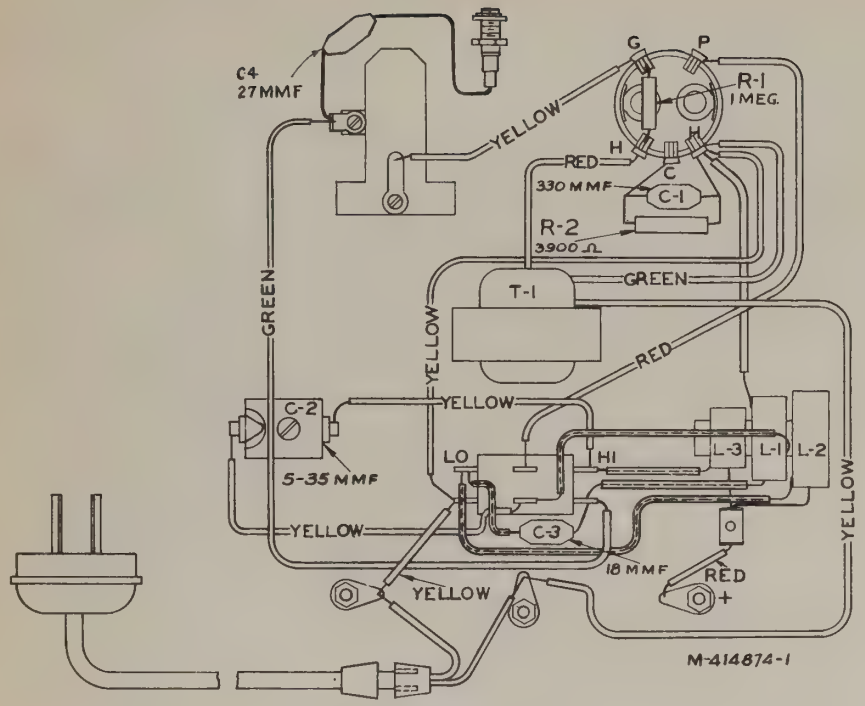


FIGURE 2 - WIRING DIAGRAM

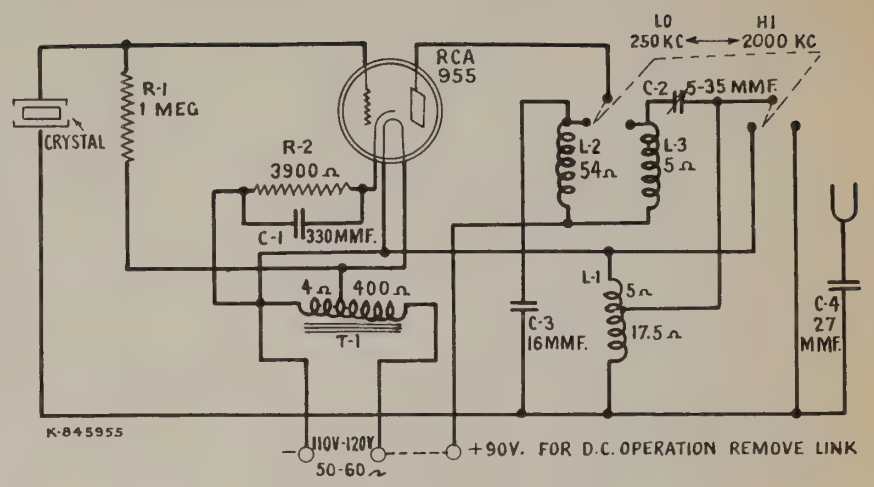


FIGURE 1 - SCHEMATIC DIAGRAM

holding the crystal top plate, lifting off the top plate, taking out crystal and cleaning crystal and top and bottom plates with pure alcohol. To reassemble, tighten nuts evenly till top plate just touches crystal when there will be no "shake" and crystal will not oscillate. Now back off approximately one turn on each nut until crystal oscillates normally. Check by means of a broadcast station such as WJR, 750 kc, or other even 250, with a receiver and with calibrator switch on "LO". Readjust crystal by turning nuts on top plate till the 750 kc point gives an audio beat with the station. For 0.05 per cent accuracy the audio note will vary with the station used. Using 750 kc, crystal would be adjusted for an audio note of 475 cycles. Adjusting to a lower audio frequency gives a higher accuracy on crystal. If adjustment of the 2000 kc trimmer has not been changed the 2000 kc steps (switch on "HI") will automatically be correct. A fibre or bakelite wrench should be used for making final adjustments.

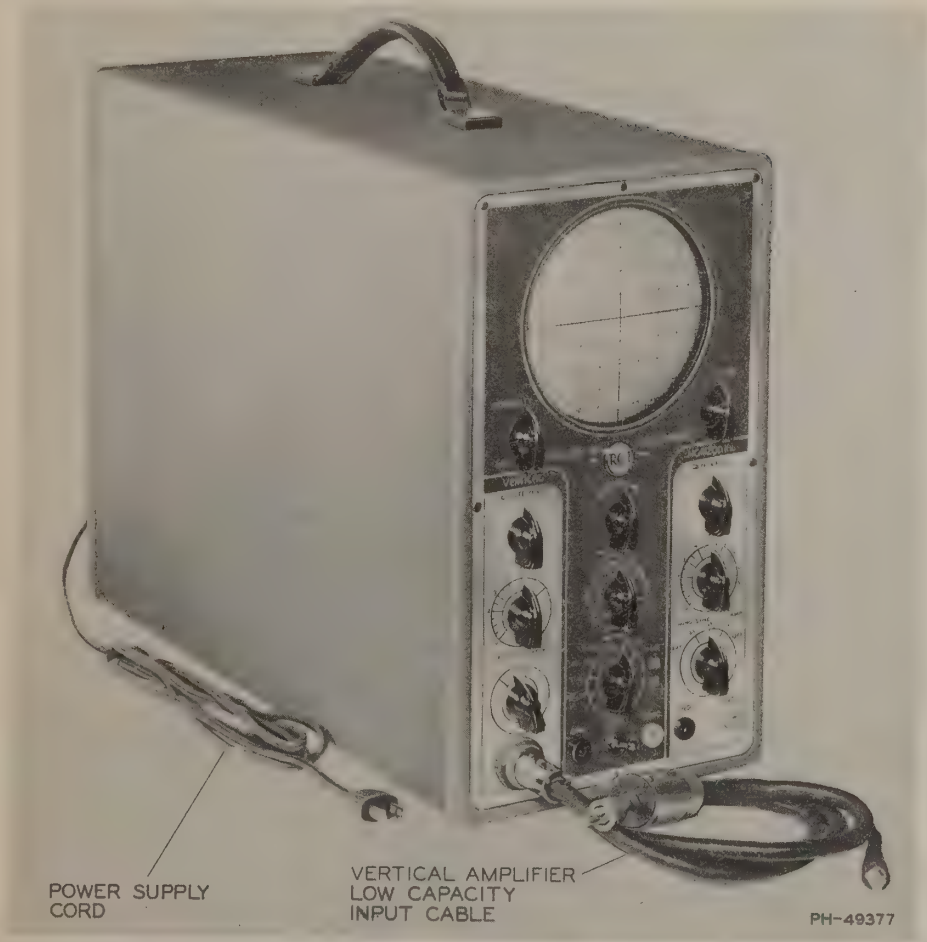
PARTS LIST

The following parts list is included to facilitate procuring replacements. In ordering such parts, the description and stock number (or drawing number) always should be specified.

Stock No.	Description
11859	Capacitor, trimmer, 3-30 mmfd
31791	Capacitor, 18 mmfd (C_3)
13605	Capacitor, 27 mmfd (C_4)
12952	Capacitor, 330 mmfd (C_1)
33607	Case, Crystal calibrator case and cover
33608	Coil, Coil assembly (L_1, L_2, L_3)
33609	Electrode, Bottom crystal electrode
33610	Electrode, Top crystal electrode
30921	Jack, Output jack
12955	Resistor, 3900 ohms, 1/4 watt (R_2)
13730	Resistor, 1 megohm, 1/4 watt (R_1)
11860	Socket, 5-contact radiotron socket
33611	Spring, Crystal electrode spacing spring
11851	Switch, D.P.D.T. toggle switch
11853	Transformer, Power transformer (T_1)

Cathode-Ray Oscillograph

Stock No. 158

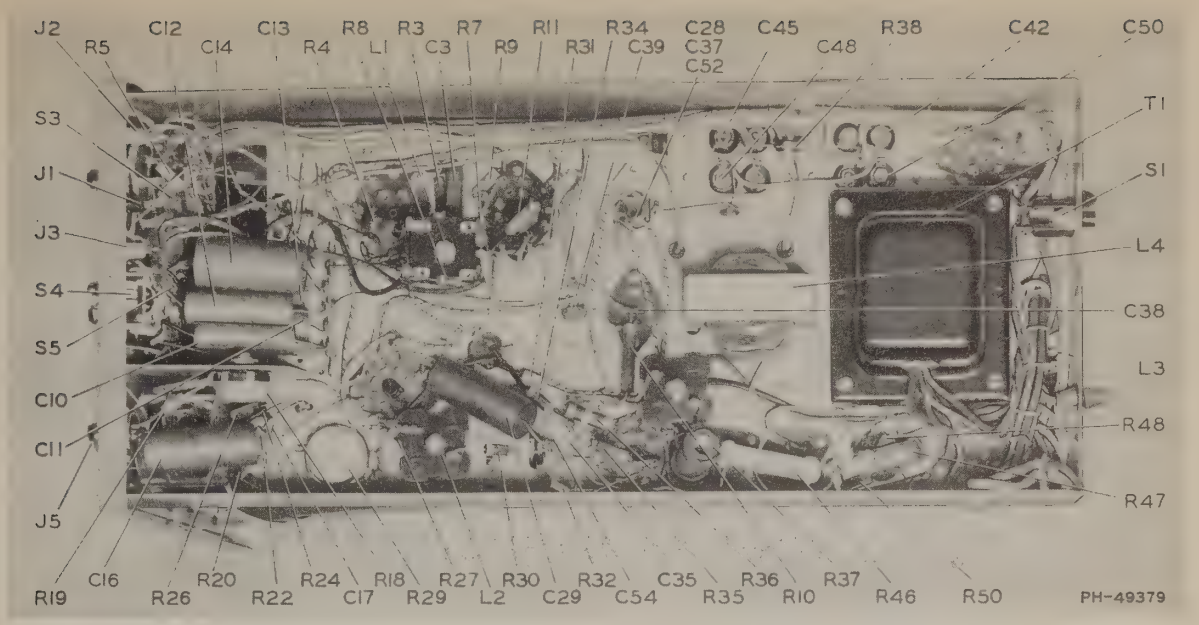


WARNING—A POTENTIAL OF 1500 VOLTS IS PRESENT AT THE CATHODE-RAY TUBE SOCKET AND AT OTHER POINTS ON THE CHASSIS. ALWAYS DISCONNECT THE POWER CORD BEFORE REMOVING THE CHASSIS FROM THE CABINET.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION
33873	Cable—Input cable complete
12814	Capacitor—5.6 mmfd. (C1, C18, C22, C26)
14079	Capacitor—6.8 mmfd. (C19, C21)
13001	Capacitor—8.2 mmfd. (C25)
12948	Capacitor—33 mmfd. (C15)
12813	Capacitor—82 mmfd. (C6, C23)
13894	Capacitor—390 mmfd. (C7)
12537	Capacitor—560 mmfd. (C17)
13054	Capacitor—1,200 mmfd. (C8)
4881	Capacitor—3,300 mmfd. (C3, C9, C35)
30856	Capacitor—.015 mfd. (C10)
30857	Capacitor—.035 mfd. (C11)
30848	Capacitor—0.1 mfd. (C12)
18000	Capacitor—0.1 mfd., 1,250 volts (C42, C45, C48, C50)
30849	Capacitor—0.25 mfd. (C4, C14, C36)
30860	Capacitor—0.5 mfd. (C16, C40, C41, C53)
18416	Capacitor—1 mfd. (C2, C13, C29, C30, C31, C32)
33879	Capacitor—10 mfd., 300 volts (C38, C39, C44, C47)
33880	Capacitor—10 mfd., 300 volts, 10 mfd., 300 volts, 10 mfd., 150 volts, 20 mfd., 25 volts (C43, C46, C49, C51)
33865	Capacitor—10 mfd., 450 volts, 10 mfd., 450 volts, 40 mfd., 25 volts (C5, C33, C34)
33159	Capacitor—250 mfd., 15 volts, 10 mfd., 350 volts, 10 mfd., 150 volts (C28, C52, C37)
12477	Choke—Filter reactor (L4)
33881	Choke—Horizontal amplifier plate choke (L1)
33867	Choke—Vertical amplifier plate choke (L2, L3)
11859	Condenser—3 to 30 mmfd., variable condenser (C27)
33866	Condenser—60 to 120 mmfd., variable condenser (C20, C24)
33870	Connector—Input cable connector (J5)
33874	Control—1,000 ohms—synchronizing control (R6)
17694	Control—10,000 ohms—low frequency compensating control (R29)
33861	Control—10,000 ohms—vertical gain control (R33)
13984	Control—50,000 ohms—compensating control (R18)
33863	Control—50,000 ohms—intensity control and power switch (R41)
33864	Control—250,000 ohms—focus control (R43)
33859	Control — 500,000 ohms — horizontal gain control or centering control (R2, R51, R52)
33860	Control—2 meg.—frequency control (Fine) (R12)
33872	Escutcheon—Front panel escutcheon
30926	Foot—Elastic foot for case
14133	Fuse—1 ampere line fuse (F1)
30925	Handle—Carrying handle for case
33891	Jack—Black pin jack (J1, J4)
33890	Jack—Red pin jack (J2, J3)
32116	Knob—Control knob
13210	Mounting—Fuse mounting strip
13428	Resistor—150 ohms, ¼ watt (R35)
12261	Resistor—390 ohms, ¼ watt (R9)
30546	Resistor—470 ohms, ¼ watt (R5)
12414	Resistor—560 ohms, ¼ watt (R34)
14076	Resistor—820 ohms, ¼ watt (R27)
14720	Resistor—1,000 ohms, ¼ watt (R3)
12267	Resistor—1,200 ohms, ¼ watt (R49)
6134	Resistor—1,200 ohms, 1 watt (R10)
13716	Resistor—2,200 ohms, ¼ watt (R32)
13714	Resistor—5,600 ohms, ¼ watt (R30)
14559	Resistor—10,000 ohms, ¼ watt (R7, R17, R20)
3219	Resistor—18,000 ohms, ½ watt (R48)
33862	Resistor—18,000 ohms, 20 watt (R37)
30409	Resistor—27,000 ohms, ½ watt (R11, R38)
14167	Resistor—27,000 ohms, 2 watt (R47)
12454	Resistor—33,000 ohms, ¼ watt (R31)
12487	Resistor—33,000 ohms, 2 watt (R46)
6143	Resistor—43,000 ohms, ¼ watt (R22)
14560	Resistor—100,000 ohms, ¼ watt (R8, R19)
3252	Resistor—100,000 ohms, ½ watt (R28, R39)
30154	Resistor—100,000 ohms, 1 watt (R4)
13483	Resistor—120,000 ohms, 1 watt (R36)
11676	Resistor—200,000 ohms, ¼ watt (R24)
14583	Resistor—220,000 ohms, ½ watt (R42)
30784	Resistor—330,000 ohms, ½ watt (R14, R50)
12285	Resistor—470,000 ohms, ¼ watt (R13, R40)
18020	Resistor—470,000 ohms, 1 watt (R44, R45)
30963	Resistor—820,000 ohms, ¼ watt (R25)
13730	Resistor—1 meg., ¼ watt (R23, R26)
30652	Resistor—1 meg., ½ watt (R1, R21)
12201	Resistor—1.5 meg., ¼ watt (R15, R16)
33871	Screen—Calibration screen for Cathode Ray Tube
31769	Socket—4-contact tube socket
18351	Socket—6-contact tube socket
18467	Socket—8-prong octal tube socket
33001	Socket—11-prong magnal socket for Cathode Ray Tube
33886	Switch—Horizontal amplifier switch (S3)
33887	Switch—Range switch (S5)
33885	Switch—Safety interlock switch (S1)
33868	Switch—Sync switch (S4)
33869	Switch — Vertical amplifier switch (S6)
33884	Transformer—105-125 V, 60 cycle power transformer (T1)
14119	Transformer — Synchronizing transformer (T2)


J2
R5
C12
C14
C13
R4
R8
L1
R3
C3
R7
R9
R11
R31
R34
C39
C28
C37
C52
C45
C48
R38
C42
C50
T1
S1
L4
C38
L3
R48
R47
S3
J1
J3
S4
S5
C10
C11
J5
R19
C16
R26
R20
R22
R24
C17
R18
R29
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C29
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C35
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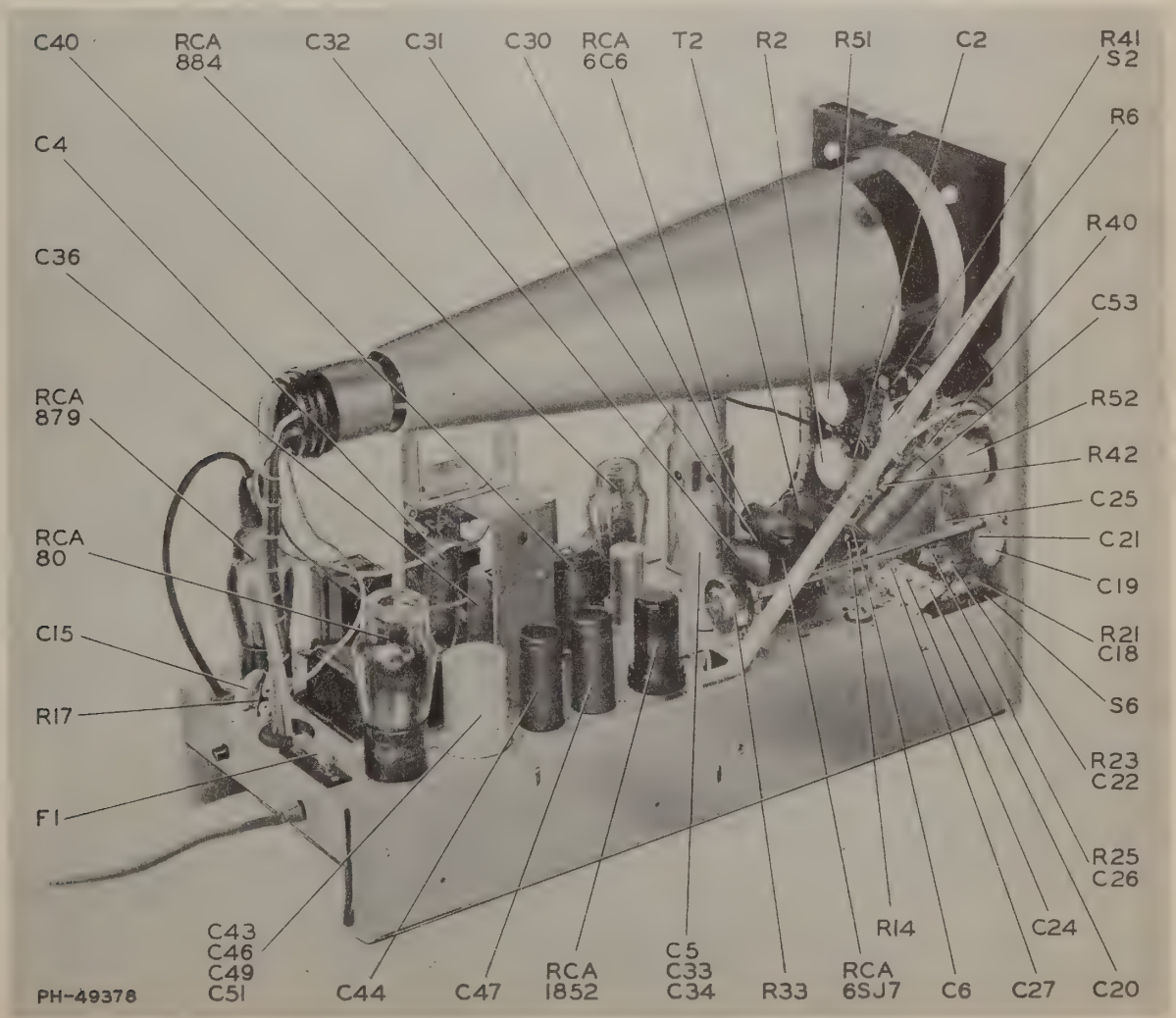
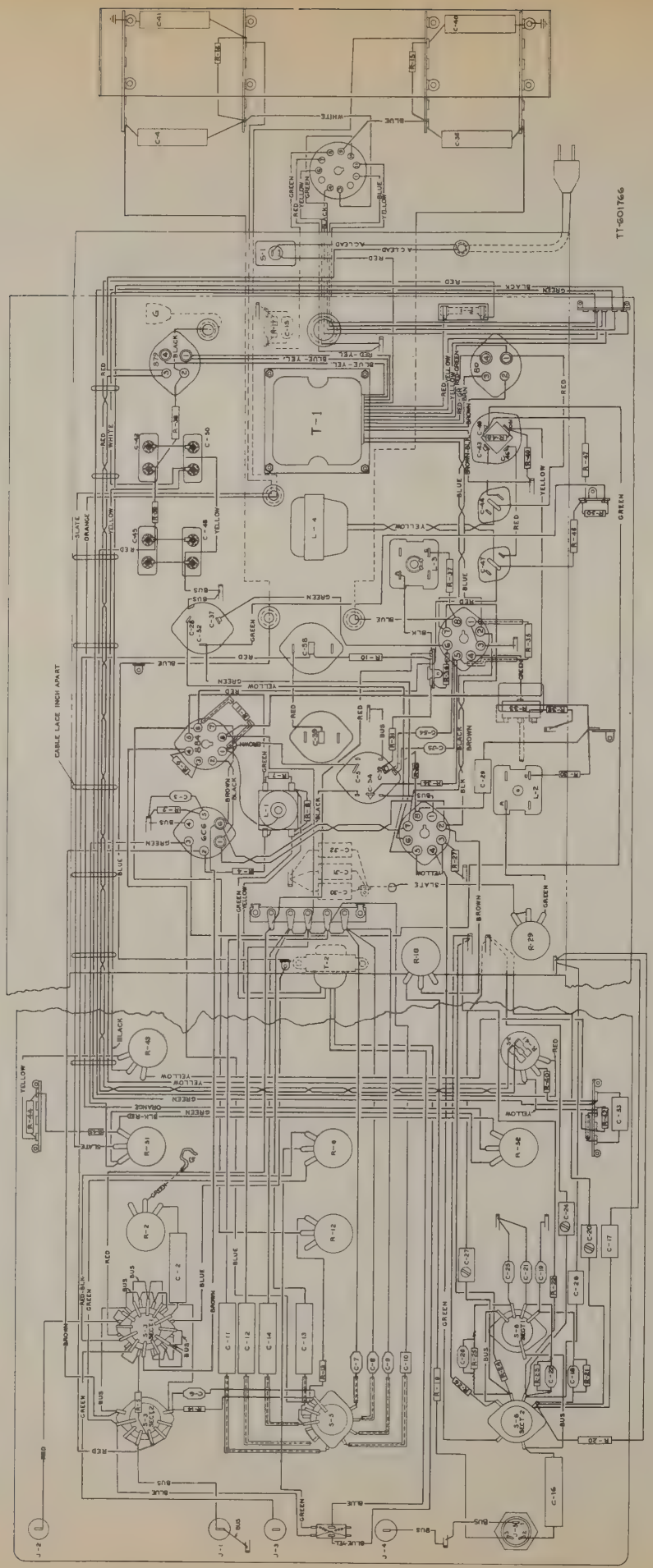
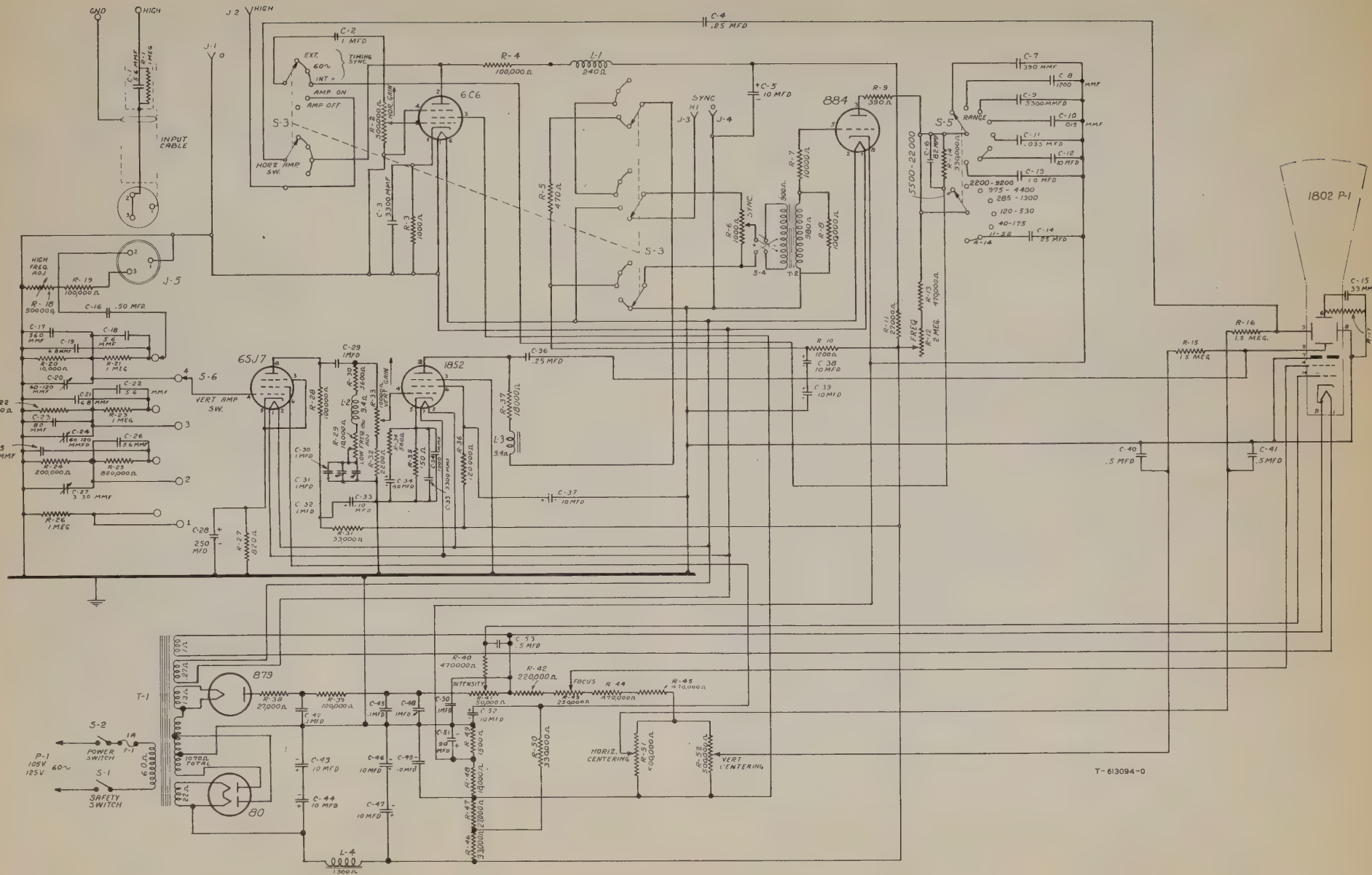
R36
R10
R37
R46
R50
PH-49379


C40
RCA 884
C32
C31
C30
RCA 6C6
T2
R2
R51
C2
R41
S2
R6
R40
C53
R52
R42
C25
C21
C19
R21
C18
S6
R23
C22
R25
C26
C4
C36
RCA 879
RCA 80
C15
R17
F1
C43
C46
C49
C51
C44
C47
RCA 1852
C5
C33
C34
R33
R14
RCA 6SJ7
C6
C24
C27
C20
PH-49378



Stock No. 158, Wiring



Stock No. 158, Schematic

TECHNICAL SUMMARY

Power Supply:

Rating ..... 105-125 volts, 50-60 cycles a-c
Power Consumption ..... 55 watts
Fuse Protection ..... 1 ampere

Operating Limits:

Deflection Sensitivity at Amplifier without Cable ..... 0.04 v, rms/inch
Deflection Sensitivity at Amplifier with Cable ..... 0.4 v, rms/inch
Input Characteristics:
Vertical Amplifier without Cable 1 megohm, 22 mmfd
Vertical Amplifier with Cable 1.1 megohm, 8 mmfd
Amplifier Frequency Response Range:
Vertical Amplifier Sine Wave .... 5-500 kc
Vertical Amplifier Square Wave 60 cycles—13,000 kc
Horizontal Amplifier Sine Wave 5 cycles— 100 kc
Maximum Signal with Amplifier, 500 volts rms
Frequency Range Timing Axis, 4-22,000 cycles
Maximum d-c at Input Jacks .. 300 volts d-c
Maximum d-c at Input Cable .. 500 volts d-c

Tube Complement:

RCA-6C6 ..... Horizontal Amplifier
RCA-6SJ7 ..... 1st Stage Vertical Amplifier
RCA-1852 ..... 2nd Stage Vertical Amplifier
RCA-884 ..... Saw Tooth Oscillator
RCA-1802 P-1 ..... Cathode Ray Tube
RCA-80 ..... Low Voltage Rectifier
RCA-879 ..... High Voltage Rectifier

Overall Dimensions:

Height (including carrying-handle) ..... 14⅜ inches
Width ..... 8 inches
Depth ..... 19½ inches

Weight (net) ..... 30 pounds

DESCRIPTION

The Stock No. 158 Cathode-Ray Oscillograph is a reliable instrument for the observation of electrical circuit phenomena. Although specifically designed for use in servicing television receivers, it is practically unlimited in application, some of its more common uses include the study of wave shapes and transients, measurement of modulation, adjustment of radio receivers and transmitters, determination of peak voltages, and tracing of vacuum-tube characteristics. Its major but not only advantage over older types of visual devices is its freedom from inertia, allowing the observation of very rapid changes of current or voltage without appreciable distortion. The instrument is entirely portable, as shown by the frontispiece illustration, and operates from an a-c source of 105 to 125 volts, 50 to 60 cycles. An integral power-supply unit furnishes all voltages required for operation.

Figure 1 shows the essential units of the instrument in block diagram form.

The primary purpose of these instructions is to give the fundamentals of operation. As the use of cathode-ray apparatus becomes more widespread, many new applications will be found and a thorough understanding of these fundamentals will enable the operator to readily adapt the equipment to his particular use. Since the instrument is built around the cathode-ray tube, the following comprehensive discussion of cathode-ray tubes will serve to explain the operation of the equipment and aid in analysis of the figures which appear on the screen. The operator is urged to read this section thoroughly to insure proper familiarity with the characteristics and performance of the equipment.

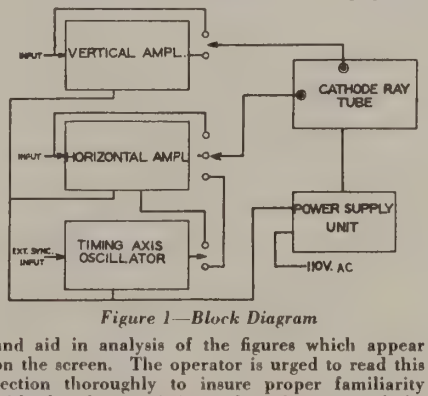


Figure 1—Block Diagram

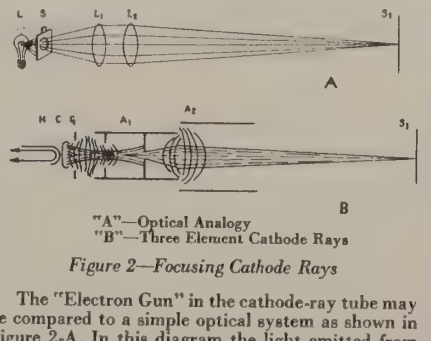
GENERAL DISCUSSION OF CATHODE-RAY TUBE

Fundamentally, a cathode-ray tube consists of (1) an electron-beam source, (2) provision for deflecting the beam, (3) provision for focusing the beam on a screen, and (4) a fluorescent screen for visibly indicating the position of the beam.

In the cathode-ray tube the electron source is a substantial indirectly-heated cathode. The cathode control electrode (grid), and focusing electrodes constitute an electron gun, used to project a beam of electrons (Function 1). Two sets of electrostatic plates at right-angles to each other are located within the neck of the bulb to provide for deflection of the electron beam (Function 2). Focusing (Function 3) is accomplished by adjusting the ratio between the voltages on anodes No. 2 and No. 1. This ratio is in the neighborhood of 5:1. In practice, the anode No. 2 voltage is generally held constant and the anode No. 1 voltage is varied, since it is the smaller potential to control. The screen (Function 4) forms one end of the tube. The inside is coated with a material which emits light when struck by the electron beam. The control electrode (grid) constitutes a means of controlling the quantity of electrons admitted into the stream, and thus allows control of spot intensity (also called "brilliancy")—the more negatively the grid is biased, the fewer electrons in the beam, the smaller the spot, and the less the intensity.

The cathode-ray tube requires a high potential between the cathode and anode No. 2. The voltage on anode No. 1 is usually around one fifth of the high voltage, and is made variable to provide a means of focusing. The bias supply to the control electrode (grid) also is made variable to provide a means of controlling the intensity. Since the anode current is usually less than 0.1 milliampere, it is entirely satisfactory to use a rectifier tube in the power supply rated at only a few milliamperes, and to employ only capacity in the filter circuit. With such a small current drain imposed on this power supply, a condenser of 0.5 mfd or more will afford very effective filtering.

The following few paragraphs constitute a very elementary development of cathode-ray tube deflection, and should be omitted by anyone familiar with the basic theory of operation of cathode-ray tubes. Those desiring to make this omission may start at "Study of Lissajou's Figures."



"A"—Optical Analogy
"B"—Three Element Cathode Rays

Figure 2—Focusing Cathode Rays

The "Electron Gun" in the cathode-ray tube may be compared to a simple optical system as shown in Figure 2-A. In this diagram, the light emitted from the lamp, "L," is focused on the screen, "S_1," by means of a double lens system, "L_1," "L_2," and the amount of light is controlled by the shutter, "S," which, when closed, shuts off the light completely. The brilliancy of the image on the screen depends on the size of opening in the shutter, "S," and the candle power or wattage of the lamp, "L." If the candle power of the lamp is fixed (that is, if we select a lamp of a given wattage), then the brilliancy is solely controlled by the shutter, "S." The size or definition of the image on the screen, "S_1," is controlled by adjusting the position of the lenses, "L_1" and "L_2," to the correct distance, which is called focusing. If the position of the lens, "L_2," is fixed, then the focus will depend solely on the adjustment of the position of lens, "L_1." Furthermore, with both lenses, "L_1 and L_2," adjusted correctly, it would be possible to change the focus by actually substituting for the lens, "L_1," various lenses until the one having the correct index of refraction is obtained. This is essentially the method of controlling the focus in the cathode-ray tube.

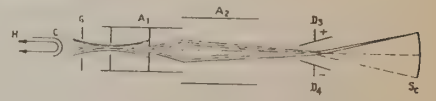


Figure 3—Deflection in One Direction

Figure 2B shows the elements constituting the "electron gun" previously mentioned. "C" is the cathode which radiates electrons when warmed by the heater, "H." The bias voltage of the grid "G" controls the number of electrons allowed to pass through it. The distance from the "gun" at which the electrons converge to a point, or "focus," is determined by the ratio of the voltages on the two anodes, A_1 and A_2. Obviously then, there is a particular ratio of these two voltages which will cause the beam to focus at the screen distance. In practice, the A_2 voltage is usually fixed and the A_1 voltage is made variable through sufficient range to assure that the beam can be focused on the screen.

Figure 3 shows the addition of one pair of deflecting plates, D_3 and D_4, to the previous figure. If these two plates are at the same potential, that is if no voltage difference exists between them, the electron stream is unaffected by their presence. However, if a difference of potential does exist between D_3 and D_4, the electron stream will be deflected toward the plate which is more positive (D_3 in the figure). (A positive charge attracts electrons, which are negative, while a negative charge repels. Both plates therefore bend the electron beam up as shown.)

Assume that a cathode-ray tube has both pairs of deflecting plates connected to a d-c source through potentiometers as shown in Figure 4A. The center position of the "electron spot" on the luminescent screen, with zero voltage on both axes, is shown at B. At C, E_1 has been raised from zero, and it can be seen that the electron beam has been deflected upward and the spot now appears near the top of the screen. At D, E_1 has been returned to zero, and E_2 raised. A horizontal deflection is obtained. The directions of deflection, BC and BD, are essentially at right-angles, due to the physical position of the electrostatic deflecting plates in the cathode-ray tube. At E, both E_1 and E_2 are impressed simultaneously, and with deflections on both axes, the spot has assumed the position resulting from the displacement in the two directions.

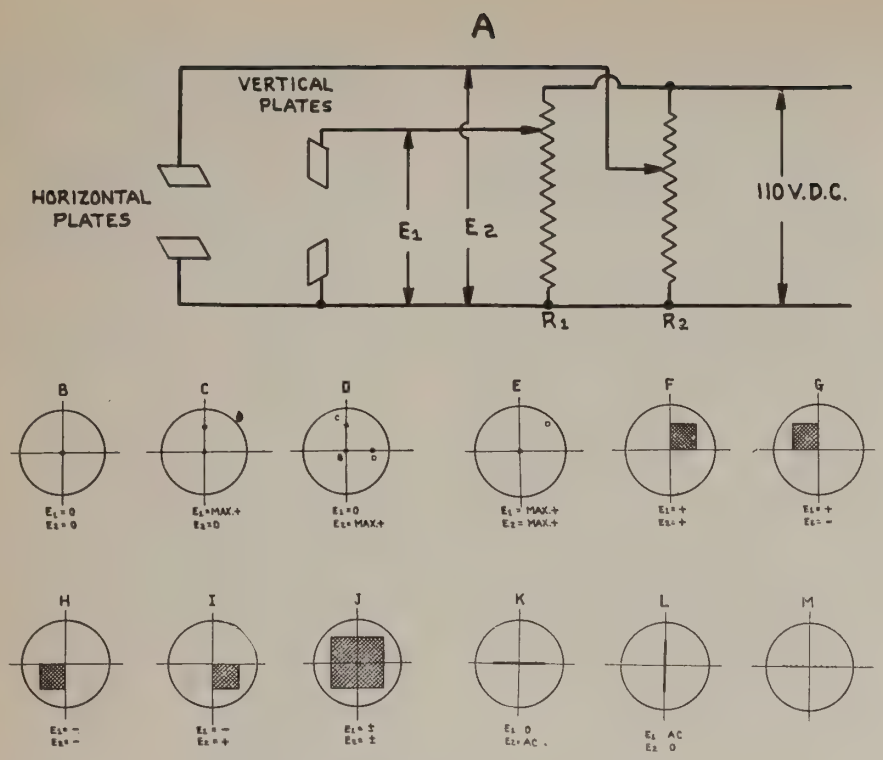


Figure 4—Application of Voltage to Deflecting Plates

It is readily apparent that by proper choice of E_1 and E_2 the spot may be made to assume any position within the shaded area of F. If the supply to R_2 is reversed, the beam will move to the left of center position as the E_2 voltage is increased from zero, and the shaded area of G applies. H and I need no explanation. J shows in shade the area the spot can be made to cover by changing polarity and value of the impressed voltages, E_1 and E_2. Now assume that a 2-cycle a-c voltage is impressed at E_2 ($E_1 = 0$). The spot will be seen to traverse the screen (see M) four times a second, and if the voltage is sinusoidal, the spot will move rapidly in the center of its travel and slowly at each end. If the 2-cycle source is replaced by a higher frequency (20 cycles or more) the spot will no longer be seen, but instead will cause a horizontal line to appear as shown at K. A similar voltage impressed on E_1, with $E_2 = 0$, gives a vertical line as in L. It should be borne in mind that the electron stream is always causing only a small spot to become luminous (assuming correct focus, etc.), but due solely to the illusion of persistence of vision (neglecting screen retentivity), the course of the spot appears as a line or image. A familiar analogy is the motion picture, in which a rapid series of still pictures gives apparent motion.

Study of Lissajou's Figures

When varying voltages are applied to the deflecting plates of a cathode-ray tube, a pattern is obtained on the fluorescent screen. The shape of this pattern depends upon the wave forms of the applied voltages, their frequencies and phase relationships. The following study of these patterns, or Lissajou's figures, is made with particular attention to their development, their use in identifying frequency ratios, and the effect of phase shift.

Figure 5 represents a sine-wave voltage (A) applied to the vertical pair of deflecting plates of a cathode-ray tube and an identical voltage (B) applied to the horizontal deflecting plates. The resulting pattern, shown by (C), is a straight line having a 45-degree slope. The direction of the slope of this line is determined by the phase relation of the two voltages as illustrated in Figures 10A and 10E.* Figure 6 illustrates the case of two identical voltages having the same amplitude but 90 degrees, or 270 degrees, out of phase. In this case, the resulting figure is a circle. If one of the figures is of greater amplitude than the other, the resulting figure will be an ellipse as shown by Figure 10C. If the phase relation is such that one voltage leads by 45 degrees, or 315 degrees, the resulting pattern will be that of Figure 10D; if leading by 135 degrees, or 225 degrees, the resulting pattern will be that of 10B. Figures 5 to 9 inclusive, show a graphical method for determining the resulting pattern, where the wave shapes, the relative amplitudes, the phase relation, and the frequencies of the two deflecting voltages are known. By means of the cathode-ray tube, the resultant pattern is traced on the fluorescent screen. Conversely, from this pattern, the frequency and the phase relations of the two deflecting voltages can be determined. Where, in addition, the wave form is known for one of the deflecting voltages, the wave form of the other can readily be obtained by graphical analysis.

Figures 5, 6, and 10A to 10E are for a 1:1 frequency ratio. When a 2:1 frequency ratio of the voltages applied to the deflecting plates is the case, the wave shapes of Figures 10A to 10E become those shown by Figures 10F and 10J.

As the ratio of the frequencies increases, the pattern becomes more complex. In Figure 7, A and B

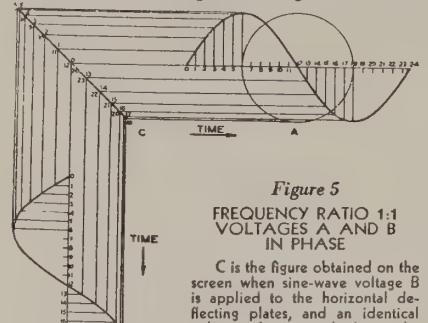


Figure 5
FREQUENCY RATIO 1:1
VOLTAGES A AND B
IN PHASE

C is the figure obtained on the screen when sine-wave voltage B is applied to the horizontal deflecting plates, and an identical voltage A is applied to the vertical deflecting plates.

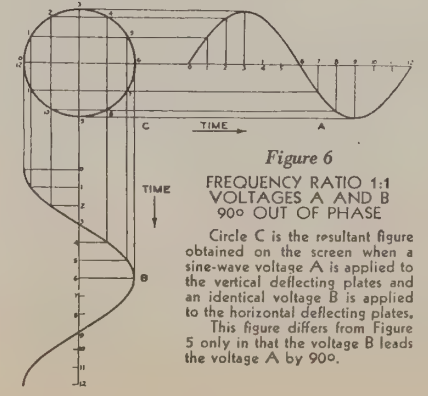


Figure 6
FREQUENCY RATIO 1:1
VOLTAGES A AND B
90° OUT OF PHASE

Circle C is the resultant figure obtained on the screen when a sine-wave voltage A is applied to the vertical deflecting plates and an identical voltage B is applied to the horizontal deflecting plates.

This figure differs from Figure 5 only in that the voltage B leads the voltage A by 90°.

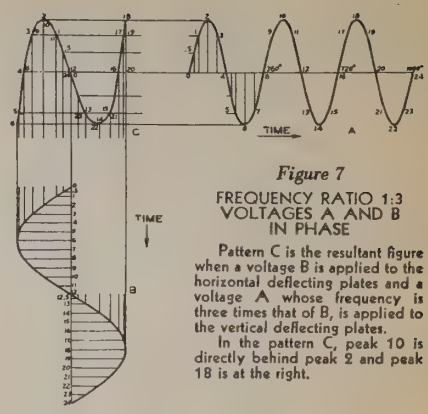


Figure 7
FREQUENCY RATIO 1:3
VOLTAGES A AND B
IN PHASE

Pattern C is the resultant figure when a voltage B is applied to the horizontal deflecting plates and a voltage A whose frequency is three times that of B, is applied to the vertical deflecting plates.

In the pattern C, peak 10 is directly behind peak 2 and peak 18 is at the right.

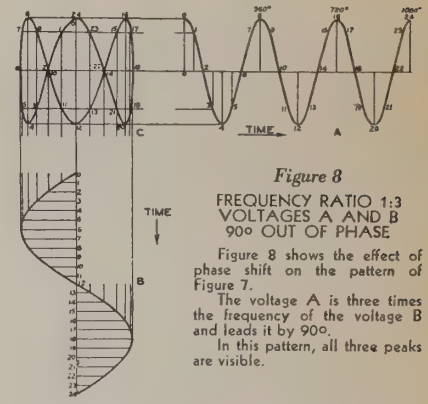


Figure 8
FREQUENCY RATIO 1:3
VOLTAGES A AND B
90° OUT OF PHASE

Figure 8 shows the effect of phase shift on the pattern of Figure 7.

The voltage A is three times the frequency of the voltage B and leads it by 90°.

In this pattern, all three peaks are visible.

are the voltages applied to the deflecting plates. In this case, the frequency of A is three times that of B. The resultant figure (C) shows a 1:3 pattern in which both voltages start in phase. Figure 8 is the same as Figure 7 except that voltage A is started 90 degrees out of phase with respect to voltage B. Figure 9C shows the resultant pattern obtained where B is a saw-tooth wave and A a sine wave. This is of interest because this type of wave form results when a linear timing axis is used. Figures 11, 12, and 13 show patterns of increasing complexity, Figure 13 being an 8:6 pattern.

When the cathode-ray oscillograph is used for calibration purposes, frequency ratios of less than 10:1 can be readily determined by visual inspection of the image. For frequency ratios greater than 10:1, the complexity of the pattern makes visual determination difficult and requires determination by means of photography. In general, the standard frequency selected should be one whose multiples and submultiples will cover the desired range and provide the simplest patterns.

*Figures 10 to 16 inclusive, and Figures 26 and 27 adapted from "Frequency Measurements with the Cathode Ray Oscillograph," Frederick J. Rasmussen, A. I. E. E. Transactions, November, 1926, Vol. XLV, Pages 1256-65.

In examining Lissajou's figures, one should consider them as the side view or elevation of a picture traced on a glass cylinder on which the observer may view the wave as it travels around the cylinder. The illusion is clearest when the whole figure rotates slowly. Figure 14 is a simple single-line pattern having a frequency ratio of 6:1. With a base frequency of 60 cycles, this pattern would be the picture for 360 cycles, or with a base frequency of 100 cycles, would be the picture of 600 cycles. The frequency ratio is determined by counting the peaks (six in number) of the waves in the horizontal plane and the

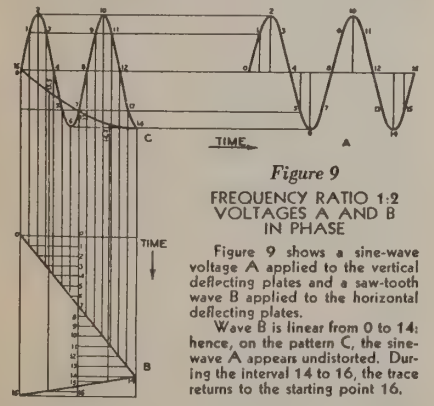


Figure 9

FREQUENCY RATIO 1:2
VOLTAGES A AND B
IN PHASE

Figure 9 shows a sine-wave voltage A applied to the vertical deflecting plates and a saw-tooth wave B applied to the horizontal deflecting plates.

Wave B is linear from 0 to 14; hence, on the pattern C, the sine-wave A appears undistorted. During the interval 14 to 16, the trace returns to the starting point 16.

number of end loops which for this case is one; hence, a frequency ratio of 6:1. In Figure 14, the front tracing has been made heavy and the back tracing light so that the two can be readily distinguished. If the figure were to be shifted slightly, the front and back waves might appear to be one. This condition might mislead the observer to believe that the frequency ratio was less than 6:1. Adjustment of the unknown frequency so that the pattern rotates very slowly, or stands still with the rear peaks uncovered by the front peaks, will make determination simplest.

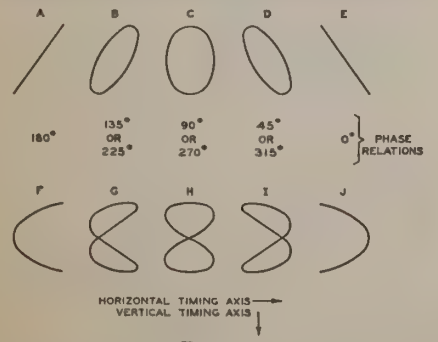
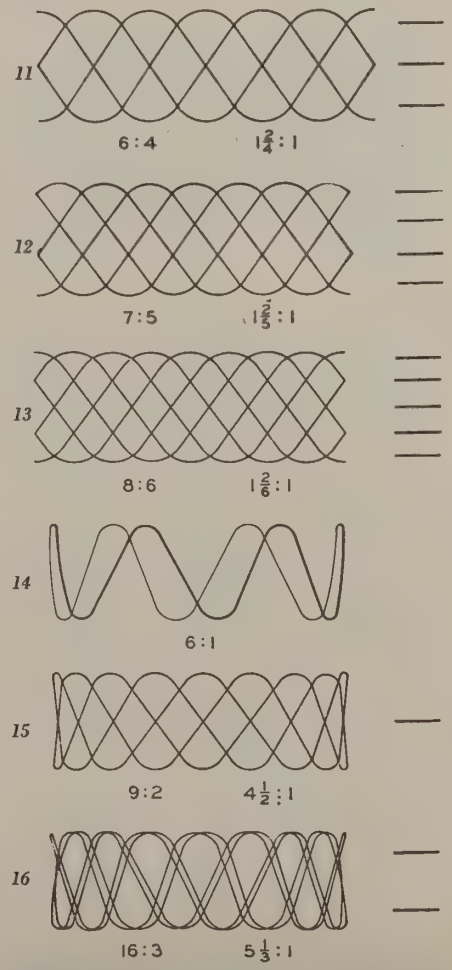


Figure 10

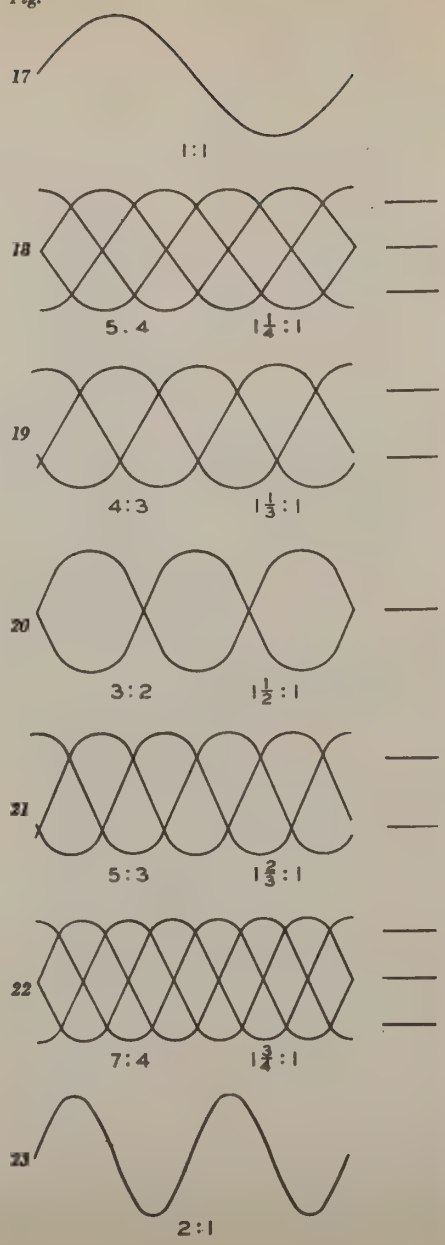
It will be observed that the wave form of Figure 14 corresponds to that of Figure 17,* a single-line pattern whose back trace is not visible. Figure 23 shows the simplest 2:1 wave or two-line figure. Figure 15 is a complete two-line figure illustrating a ratio of 9:2, which again, is readily determined by counting the number of peaks along the top of the figure and the number of loops at the end. Figure 16 has 16 peaks and is a three-line pattern, indicating a frequency ratio of 16:3.

Fig.



*Figures 17 to 25, inclusive, adapted from "The Cathode Ray Oscillograph in Radio Research," R. A. Watson Watt. Published by His Majesty's Stationery Office, London, England.

Fig.



Figures 14, 15, and 16 illustrate patterns as they generally appear on the fluorescent screen. Figures 11 to 13, and 17 to 23 are shown as pictures whose appearance suggests that the pattern has been developed on a plane. They have been shown in this fashion to facilitate study.

An optional method for determination of the frequency ratio is that of comparing the number of peaks on a given figure with the horizontal lines of intersections on the figure instead of with the number of loops at the end of the figure. A study of some of the patterns will make this clear. In Figure 20, there is a single line of intersections along the axes of the figures. It can easily be seen that this is a two-line figure by comparing it with the single line Figures 17 and 23. Figures 16, 19, and 21 having two horizontal lines of intersections, each spaced approximately one-third from the top and bottom, are three-line patterns. In the same manner, the four-line patterns of Figures 11, 18, and 22 are distinguished by three lines of intersection, the five-line pattern of Figure 12 by four lines of intersection, and the six-line pattern of Figure 13 by five lines of intersection with characteristic positions for these lines in each case. Thus, the frequency ratio is also equal to the number of peaks on circumference divided by the term, one + number of horizontal lines of intersection.

Of the patterns from 5 to 23, those of Figures 17, 23 and 7 show simple ratios of 1:1, 2:1, and 3:1. Both these direct multiples and fractional multiples of the base frequency are available to the user of the cathode-ray oscillograph. For example, with a base frequency of 60 cycles, the following tabulation will serve to illustrate the sequence of relatively simple patterns obtained as the frequency of the variable unit is decreased from a 1:1 ratio of frequencies to a 3:1 ratio.

Frequency In Cycles-Sec.	Frequency Ratio* Whole Number	Fractional	Illustrated By Figure
60	1 : 1	1 : 1	17
75	5 : 4	1¼ : 1	18
80	4 : 3	1⅓ : 1	19
90	3 : 2	1½ : 1	20
100	5 : 3	1⅔ : 1	21
105	7 : 4	1¾ : 1	22
120	2 : 1	2 : 1	23
135	9 : 4	2¼ : 1	—
140	7 : 3	2⅓ : 1	—
150	5 : 2	2½ : 1	—
160	8 : 3	2⅔ : 1	—
165	11 : 4	2¾ : 1	—
180	3 : 1	3 : 1	7

*The frequency ratio is expressed either as a ratio of two integers, the first of which represents the number of peaks and the second the number of lines in the patterns, or as a ratio of a whole number and a fraction to unity. The denominator of the fraction is equal to the number of lines in the figure.

If the base frequency is 1000 cycles instead of 60, the same ratios hold. Thus, instead of 60 to 180 cycles, the frequencies for these patterns would be those for 1000 to 3000 cycles with intermediate values of 1250, 1333⅓, 1500, 1666⅔, 1750 cycles, 2000 cycles, 2250 cycles, 2333⅓ cycles, 2666⅔ cycles, and 2750 cycles.

When waves having frequency ratios greater than 10:1 are compared, accurate determinations may be difficult with the front and back portions of the

figures in the same horizontal plane. To separate the back and front portions, the figures can be displaced to show either on an ellipse or a circle.

For an ellipse, a phase-splitting device as shown in Figure 28 is employed. Resistance R_1 is connected across one set of deflecting plates and capacitance C is connected across the other pair. With R_1 at maximum resistance, the phase shift is almost 90 degrees. As R_1 is decreased, the phase shift decreases. Figures 24 and 25 show the same single-line pattern and were obtained by adjusting the circuit of Figure 28 for different vertical amplitudes. Figure 26 is a two-line pattern having a frequency ratio of 31:2. The frequency ratio of this figure would be much more difficult to determine without displacement.

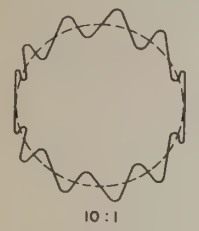


Figure 24

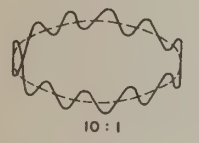


Figure 25

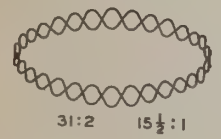


Figure 26

Figure 27

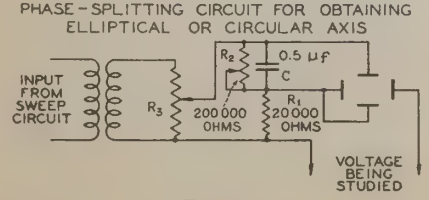


Figure 28

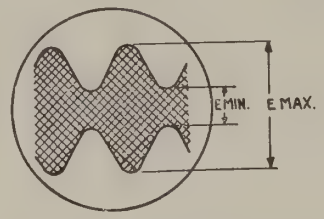
It was pointed out that the patterns of Figures 11 to 13, and 17 to 23 are developed on a plane. The resulting patterns are much simpler than they would be with their normal appearance because the back wave has been removed by spreading it out in the same plane with the front wave. The advantages of this simplified appearance can be obtained in practice by total elimination of the back wave. Where there is some doubt as to the number of lines in a pattern because of the presence of the additional lines of intersections observed in the back wave, this method will be of considerable assistance. Figure 15, for instance, is a two-line pattern, as is shown by the two loops at the end of the figure. However, because of the shift of the figure, the intersection made by the lines of the back wave with the lines of the front wave give it the same appearance as the five-line pattern of Figure 12. To eliminate the back wave, voltage of the same frequency as that used for the spreader, but 90 degrees out of phase, is applied to the control grid of the cathode-ray tube. Adjustment of this voltage will permit weakening the back wave and brightening the front wave, or the total elimination of the back wave.

General Applications

The most universal method of employing a cathode-ray tube is to impress the voltage to be observed on the vertical deflecting plates and to impress a voltage varying linearly with time on the horizontal axis. The latter voltage is usually obtained from an oscillator having a "saw-tooth" characteristic (see page 17). The true wave form of the signal on the vertical axis can then be observed without distortion, since none is introduced by the horizontal signal source. The conventional procedure when observing recurrent phenomena is to operate the timing-axis supply at a sub-multiple of the observed frequency, so that several complete cycles will appear on the screen. Since the image will drift across the screen unless the ratio of the two frequencies remains constant and of a certain value, it is usually desirable to synchronize the timing-axis oscillator. For the observation of transient phenomena the timing-axis supply frequency is, of course, not critical and synchronizing is often useless. In some cases, however, it is desirable to synchronize the start of the phenomenon with a timing-axis impulse.

Although use of a linear timing axis is fairly general, there are quite a few applications of the tube which do not employ one. From the table on page 8, it can be seen that if a sine-wave source of known frequency is impressed on one axis, a variable-frequency source can be impressed on the other axis and calibrated at a number of points other than the known frequency. The phase shift in an electrical device can be observed by impressing the input on one axis and the output on the other axis. If there is 0 or 180-degree phase displacement in the unit, a sloping straight-line image will appear. Refer to Figure 10 (A to E). If the above electrical device happened to be a frequency doubler, Figures 10F to 10J would apply.

Either set of deflecting plates can be used as a peak voltmeter. The impedance can be made very high, and the input capacitance very low, so that the voltmeter will show no discrimination between d-c and reasonably high radio frequencies. Transients can be observed almost as effectively with a sine-wave timing-axis supply as with a linear one, as in this case the supply functions purely as a "spreader."

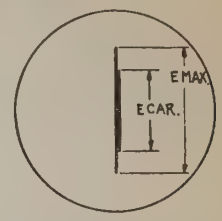


R. F. Modulated at 1000 Cycles
Timing Axis Supply: 500-Cycle Saw-Tooth

$$\text{Percent Modulation} = \frac{\text{EMax.} - \text{EMin.}}{\text{EMax.} + \text{EMin.}} \times 100$$

Figure 29

In order to illustrate the flexibility of such apparatus, a desired measurement will be assumed and several methods of obtaining the unknown quantity outlined. An r-f oscillator is being modulated an unknown amount with a 1000-cycle tone, and it is desired to determine the percentage modulation. One method is to observe the modulated r-f envelope by impressing either a sine-wave or linear supply on the horizontal axis and impressing the modulated r-f signal on the vertical axis. Figure 29 shows this method graphically. Incidentally, if a linear timing axis is used, as shown, the true wave-shape of the envelope will appear, and an appreciable lack of symmetry or other irregularities will be immediately apparent, indicating distortion. If no timing-axis voltage is used, the percentage can be determined as shown at Figure 30. This obviously necessitates removal of modulation. A third method is shown at Figure 31. The 1000-cycle audio voltage which is modulating the r-f signal is impressed on the horizontal axis (modulated r-f remains on vertical). A trapezoid results which allows ready measurement of the peak deflections. Symmetry of modulation can be checked with methods of Figures 29 or 31 by removing modulation from the r-f oscillator and noting whether the carrier height is mid-way between the positive and negative audio heights.

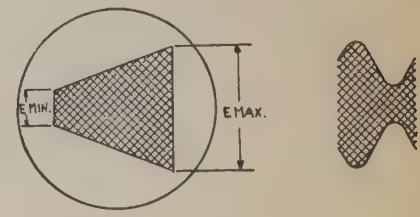


Timing Axis Supply—None

$$\text{Percent Modulation} = \frac{\text{EMax.} - \text{ECar.}}{\text{ECar.}} \times 100$$

Figure 30

Another application of the cathode-ray tube is as a "visual" or curve-tracing device. This consists of an r-f oscillator being varied at an audio rate between two extremes of frequency, a means of displacing the indicating device horizontally in synchronism with the change of radio frequency, and a means of obtaining vertical deflection of the indicating device proportional to the output of the unit whose performance is to be observed. In one method, a variable capacitor is used to "sweep" the frequency of the r-f (test) oscillator continually, and at the same time an impulse generator, driven in synchronism with the "sweep" capacitor varies an oscillator capacitor, providing horizontal displacement of the indicating device in synchronism with the "sweep" capacitor. More recently, electronic frequency modulators requiring no moving parts have become popular. Perhaps the greatest use of such a device is for alignment of the intermediate-frequency stages of superheterodyne receivers. A frequency-response curve of the circuit under test is continually before the aligner, which allows rapid and very accurate adjustment of the



Timing Axis Supply—The Modulating Signal

$$\text{Percent Modulation} = \frac{\text{EMax.} - \text{EMin.}}{\text{EMax.} + \text{EMin.}} \times 100$$

Figure 31

stage in question. The great advantage from such a system is realized when the circuit to be aligned has sufficiently greater than critical coupling to give a flat-topped or double-peaked response. The same result can eventually be obtained by manually plotting a curve each time an adjustment on the unknown is made. However, this latter method is very laborious and requires considerable time.

Alignment of the radio-frequency stages of receivers can be made using the same method discussed above for i-f alignment. The single-frequency source and output meter method may be used, if desired, but from the standpoint of demonstrating the performance of the r-f stages or explaining their operation, the oscillographic method is preferable.

Another type of visual, commonly known as a "universal" type, has as its primary function the measurement of capacity and inductance. Fundamentally, it is the same as the visual described above for aligning i-f stages, but the i-f stage, instead of being the part under test, is permanently incorporated in the equipment. In other words, the output of the r-f oscillator, instead of feeding the grid of an i-f tube, is coupled to a tuned tank circuit which is across the grid circuit of a detector tube. Parts are tested by comparing the resonant frequency of this tank circuit with a part of known characteristics to the resonant frequency with a part of unknown values. (In either case, the part forms a portion of the tank circuit.) The universal visual is chiefly applicable for quantity testing of coils and condensers. Very rapid testing can be done, as there is only the necessity of connecting the part to be tested and observing the position of the curve on the screen. Small fixed condensers have been tested manually as rapidly as 2,000 per hour on equipment of this type, though this is somewhat above average. The visual also has the advantage of affording a test at any radio frequency, so that difficulties from skin effect, distributed capacity and inductance can be greatly reduced by employing a frequency at or near the one the part will be subjected to in use.

In using cathode-ray tubes, the voltage under observation often is not of sufficient value to give the desired amount of deflection and a voltage amplifier must be employed. The amplifier should have an essentially flat output over a sufficient frequency range to avoid appreciable distortion of the observed signal. For ordinary use, it is not objectionable if the amplier is non-linear above the sixth harmonic of the frequency of the observed voltage.

INSTALLATION

Remove the screws at the rear of the case. Withdraw the chassis from the case, feeding the power cable through the hole in the back. Make certain that all tubes are firmly in their sockets and that all grid-cap connections are in place. Unpack the cathode ray tube and install it in its proper mounting and connect the socket, rotating the tube if necessary so that the socket key is located at the top. Replace the chassis in the case and replace the screws at the rear. With the "*Intensity*" control in the extreme counterclockwise *("Off")* position, plug the power-supply cable into an electrical outlet supplying 105-125 volts at at 50-60 cycles. The instrument is then ready for operation.

NOTE: AN INTERLOCK SWITCH, LOCATED AT THE REAR OF THE CHASSIS, OPENS THE POWER CIRCUIT WHEN THE CHASIS IS REMOVED FROM THE CASE. DO NOT ATTEMPT TO OPERATE THE EQUIPMENT WHILE WITHDRAWN FROM THE CASE AS THE HIGH POTENTIALS USED ARE DANGEROUS.

OPERATION

Controls

Refer to the schematic and wiring diagrams for the location of circuit units designated by symbols.

1. "*Intensity*" control (R-41) consists of a potentiometer located in the high side of the high-voltage bleeder and controls the bias on the grid of the cathode-ray tube, which in turn determines the quantity of electrons emanating from the "gun," thus controlling the spot size. The power switch (S2) is attached to this potentiometer. Initial clockwise rotation of this control closes the switch and additional rotation increases the spot size.

2. "*Focus*" control (R-43) is a potentiometer located in the high-voltage bleeder. Its position controls the No. 1 anode voltage, which, with constant voltage on anode No. 2, determines the distance at which the electron beam focuses. In general, for a given "*Intensity*" setting, the "*Focus*" control should be set for maximum distinctness of spot or image.

3. "*Vertical Amplifier*" switch (S-6) is an input attenuator in the grid circuit of the first amplifier stage. The attenuation steps are approximately 1:5. Connection to the input is made through a special cable which may be omitted if higher input capacity is permissible. An increase in sensitivity of approximately 10 to 1 is obtained without the cable. Input connection, in this case, is made to terminal #2 of the input jack.

4. "*Horizontal Amplifier*" switch (S-3) has five positions: The amplifier "*On*" and "*Off*" and three "*Timing*" positions. On all "*Timing*" positions the "saw-tooth" or timing-axis oscillator feeds through an amplifier to the horizontal deflecting plates of the cathode-ray tube. At "*On*," the "*Horizontal*" phone tip jacks are connected through an amplifier to these deflecting plates while at "*Off*," the phone tip jacks are connected straight through to the deflecting plates. In both of the latter two cases, there is a series condenser in the input circuit.

5. "*Vertical Gain*" control (R-33) consists of a potentiometer located in the grid circuit of the 2nd stage of the vertical amplifier. With the "*Vertical Amplifier*" switch set for any given position this potentiometer controls the vertical deflection. By advancing the "*Vertical Amplifier*" switch from a lower to the next largest number the sensitivity is cut approximately 5 to 1.

6. "*Horizontal Gain*" control (R-2) consists of a potentiometer located in the input circuit of the horizontal amplifier. With the "*Horizontal Amplifier*" switch set at "*Timing*" or "*On*," this potentiometer controls the horizontal deflection. Due to the capacity load on this input potentiometer, when operating on "*Timing*" at the higher audio frequencies, linear sweep will not be obtained at all settings of this control. For best results, the control should be set for maximum linearity.

7. "*Range*" switch (S-5) selects one of eight timing capacitor values. It thus changes the timing-axis oscillator frequency in steps, giving eight ranges approximately as shown on the front panel.

8. "*Freq.*" control (R-12) is a rheostat connected in series with the timing condenser. It changes the timing-axis oscillator frequency gradually as it is rotated, and in conjunction with the "*Range*" switch, gives a continuous range between the extremes of frequency.

9. "*Sync.*" control (R-6) is a potentiometer used to control the amount of synchronizing voltage fed to the grid of the RCA-884 tube. In general, it should be set as far counter-clockwise as is consistent with a locked image, since over-synchronization results in a poor wave-form produced by the timing-axis oscillator.

10. The "*Sync.*" switch provides for a 180-degree phase shift of the image on the screen.

11. "*Horizontal Amplifier*" switch (S-3) has three timing positions, "*Int.*," "*60.*" and "*Ext.*" for synchronization. At "*Int.*," the voltage drop across resistor R-5 in the plate circuit of the vertical amplifier is fed through the "*Sync.*" control and input transformer to the grid of the RCA-884 tube. Thus, the timing-axis oscillator can be synchronized with the signal on the vertical axis at the fundamental frequency or at any sub-multiple, such as ½, 1/3 . . . Synchronization is not effective if it is attempted to operate the timing-axis oscillator at a higher frequency than that of the synchronizing voltage. When set to "60" a portion of the 60 cycle filament voltage is used for synchronization. On "*Ext.*," the "*Sync.*" phone tip jack is connected to the "*Sync.*" control. This allows the use of an external source for synchronizing.

12. The two "centering" controls regulate the amount of d-c potential between the two deflecting plates of each pair, and thereby allows adjustment of the position of the spot or image. There is sufficient voltage across these controls to move the spot approximately two inches on the screen. Start with both of these controls adjusted at about mid-position.

13. There are four phone tip jacks provided on the panel. A voltage applied to the "*Horizontal*" jacks, with the horizontal amplifier switch S-3 in the "*On*" position, will result in a horizontal deflection of the spot. The "*Sync.*" phone tip jack is used for external synchronization of the saw tooth oscillator. The "*Gnd.*" jacks are connected to the chassis. A switch labeled "*Sync.*" controls the synchronization of the saw tooth oscillator with the source on either positive or negative impulses.

Applications

The following procedures are included in order to familiarize the operator with the operations and connections involved in particular applications. All applications of the equipment are not described, but analysis of any other problem will show wherein it is similar to or differs from those given, enabling the operator to work out his own sequence of operation.

As has been pointed out previously, most applications of this instrument are performed with the output of the unit under test connected to the vertical plates of the cathode-ray tube, and the wave shape studied by application of known constants on the horizontal plates of the tube. Before any measurements are attempted, the operator is urged to go through the following procedure in order to familiarize himself with the controls and their location and to get the "feel" of their operation:

1, Connect the power plug to an a-c source of 110/120 volts, 50/60 cycles. Turn the "*Intensity*" control clockwise, causing a spot to appear on the screen, increasing in size as the "*Intensity*" control is advanced further clockwise. The "*Focus*" control should then be adjusted until maximum distinctness of the spot or image occurs. The centering controls should be set about mid-position.

CAUTION. DO NOT ALLOW A SMALL SPOT OF HIGH BRILLIANCY TO REMAIN STATIONARY ON THE SCREEN FOR ANY LENGTH OF TIME, AS DISCOLORATION OR BURNING OF THE SCREEN WILL RESULT.

With the spot on the screen and with the "*Intensity*" control retarded so that the spot is not too brilliant, adjust the position of the spot to the center of the screen by rotation of the two centering controls. After initial adjustment, these controls will rarely require re-adjustment, unless the cathode-ray tube is replaced.

To turn the equipment off, turn the "*Intensity*" control to its extreme counterclockwise position, until a distinct "snap" is heard.

2. Apply a source of 60-cycle current to the input cable. To adjust the length of the resultant line appearing on the screen, turn the "*Attenuator*" switch to one of its four positions and adjust the "*Gain*" control until the length is as

desired. The line will be as shown in Figure 4L. Application of the same 60-cycle source to the "*Horizontal*" pin jacks with the "*Horizontal Amplifier*" switch "*On*" or "*Off*" will similarly show a horizontal line on the screen, the length of which may be varied (with the "*Horizontal Amplifier*" switch "*On*") by manipulation of "*Horizontal Gain*" control. See Figure 4K.

3. To expand (2) further, have 60 cycles available at both "*Horizontal*" and "*Vertical*" terminals.

CAUTION. Since all ground or "*Gnd*" pin jacks on the oscillograph are common, it is advisable to use an isolating transformer for one supply, so that there is no common connection between the two.

Apply the horizontal 60-cycle supply to the deflecting plates, preferably through the amplifier and its gain control, then apply the 60-cycle vertical supply through the other amplifier and its gain control. The result will be a straight line. (See Figure 5 and explanation.)

AC Voltmeter with Amplifier—For this application, the characteristics of the unit are as follows: Input resistance—1.1 megohm, input capacity—approximately 8 mmfs; voltage range—approximately 175 volts (higher with external attenuator); calibration—approximately 0.64 peak volts per inch or 0.4 r-m-s volts per inch.

Procedure—Make connections to the Oscillograph and turn controls to the proper positions. Measure or estimate the length of line appearing on the screen in inches (depending on accuracy desired) and multiply by 0.64. This gives the approximate peak value of the unknown voltage. For approximate effective value, if voltage being measured is sinusoidal, divide peak value by 1.4.

Procedure—Make connections and adjust controls. With the "*Vertical Gain*" control in the extreme clockwise position, a line one inch long is obtained on the screen for about 0.64 peak volts input. Intermediate positions of the gain control give different calibrations, of course, and if considerable use is made of this feature, it may be advisable to plot a curve of the inputs required to give a one-inch deflection at various intermediate positions of the gain control. If working at a frequency above 10,000 cycles, it must be remembered that retarding the gain control from maximum impairs the linearity of the amplifier.

A particular application of operation as an a-c voltmeter is in making hum measurements in a power supply unit. In this case, the "*Gnd*." pin jack or cable ground lead ("*Vertical*") is connected to the common lead of the filter circuit of the unit under test and the input cable is used to check the a-c ripple present at the various circuit component terminals.

Audio Quality Measurements—Use of the "saw-tooth oscillator" feature of the oscillograph provides a check which cannot be made with an ordinary voltmeter. This is extremely helpful in determining the audio quality of a receiver or similar instrument and also in locating causes of audio distortion.

Procedure—Apply the output from a constant frequency record or audio oscillator to the input cable. Turn the "*Range*" switch to that tap giving a range including the frequency of the input signal and adjust the "*Freq.*" control until the saw-tooth oscillator frequency is near that of the input signal. If the two frequencies are identical, one cycle of the input signal will be observed on the screen; if the saw-tooth oscillator frequency is one-half that of the input signal, two cycles of the latter will appear; if one-third, three cycles; etc. Next, connect this constant frequency record or audio oscillator output to the audio input of the unit under test and connect the output of the unit under test to the input cable of the oscillograph. If the resultant wave does not correspond to that obtained when the input was direct to the oscillograph, audio distortion is present.

If it is desired to measure the overall audio fidelity of a receiver, for instance, the procedure is similar to that above except that the voltage modulating an r-f oscillator is fed into the oscillograph, adjusted as above. Then the modulated oscillator is connected to the r-f input terminals of the receiver and the loudspeaker voice coil connected to the oscillograph. Comparison of the two resultant waves will indicate how much distortion occurs in the receiver under test. Observing the quality of the input to the receiver from the test oscillator will also show how much distortion is being fed into the receiver from the test oscillator. This is desirable since it may show that all the distortion present in the receiver output may not be due to the receiver characteristics, but to those of the test oscillator (assuming no distortion from modulation).

Modulation Indicator—(1) One method of measuring the modulation of a transmitter is to place the modulated r-f output of the transmitter into the vertical plates of the cathode-ray tube and the audio input signal to the transmitter on the "*Sync.*" pin jacks.

Procedure—Connect a constant-frequency input to the transmitter and connect a small pickup coil, located near the transmitter tank coil, to the input cable. The pickup on this coil should be from 1.2-10 volts. Connect the "*Sync.*" pin jacks of the oscillograph to the transmitter audio amplifier at a point providing a 2- to 4-volt signal. Set Horizontal Amplifier switch to "*Ext.*" position. Turn the "*Range*" switch to the tap which includes the frequency of the input signal and adjust "*Freq.*" control until the saw-tooth oscillator interlocks with the signal on the vertical plates. Adjustment of the "*Sync.*" control provides control of the voltage from the audio amplifier to the grid of the RCA-884 tube. Adjustment of "*Horizontal Gain*" control varies the horizontal deflection.

(2) Another and somewhat similar method of modulation measurement is to connect the pickup coil to the input cable as before, but connect the audio signal (from the transmitter audio amplifier) to the "*Horizontal*" jacks. Adjust "*Horizontal Gain*" control until desired horizontal deflection is obtained. The percentage modulation can then be readily determined. See Figure 31.

Alignment of Intermediate-Frequency Stages—When using this instrument with any given receiver specific instruction sheets on that particular receiver should be obtained from your distributor and carefully followed. For alignment of the intermediate-frequency stages of a receiver, it is essential that an auxiliary apparatus be available to sweep the intermediate frequency for which the receiver is designed. The Stock No. 9558 (Type TMV-128-A) Frequency Modulator is designed for this use. It consists of sweep condenser and a synchronizing generator rotated in synchronism by a driving motor. The condenser is arranged to "sweep" the frequency of the r-f input to the receiver (or i-f stages) and the synchronizing generator connects to the "*Sync.*" jack of the oscillograph so as to synchronize the saw-tooth oscillator with the frequency variation of the test oscillator (such as the Stock No. 153) input to the receiver. A switch on the panel of the frequency modulator provides two ranges of capacity for "sweeping" the test oscillator output frequency; on "*Hi*" the range is 20-65 mmfd, and on "*Lo*" the range is 15-35 mmfd. The electronic sweep test oscillator, Stock No. 150, provides a frequency-modulated signal and a synchronizing signal, so that no other frequency modulator is required.

The test oscillator output should be coupled to the grid of the tube preceding the i-f stage under alignment. It is essential that this connection be made without altering any of the operating characteristics of this stage. If the grid of the tube to which connection is to be made is at zero d-c potential with respect to ground, connect the oscillator to the grid of the tube and disconnect the lead normally on the grid, the low side of the test oscillator output returning to chassis ground. If the grid is not at zero d-c potential with respect to ground, connect the high side of the oscillator to the grid (disconnecting the lead on the grid) and the other side to the "—C" lead for this grid.

The "*Vertical*" input cable of the oscillograph should be connected to the audio output of the second detector. For a diode detector, this connection may be across the volume control alone or across both the volume control and automatic volume control resistor, if this connection is convenient. When the second detector is a triode, tetrode or pentode, resistance-coupled to the first audio stage, the connection to the input cable may be to the plate of the tube, the "*Gnd*" lead being connected to ground. In the case of a triode, tetrode or pentode, transformer- or impedance-coupled to the first audio stage, connect a resistor of approximately 20,000 ohms in series with the plate of the tube and by-pass the inductance in the plate circuit by a 1.0 mfd or larger capacitor. This changes the impedance of the plate circuit to resistance rather than inductive reactance; the input cable should be connected to the plate of the tube and the "*Gnd.*" lead to ground in order to take the audio voltage off this resistor.

Alignment of Radio-Frequency Stages—The equipment used for r-f alignment is identical to that for i-f alignment, except that the test oscillator output is connected to the antenna lead of the receiver, and different frequencies are employed.

Frequency Measurements—In using the oscillograph for frequency measurement, either Lissajou figures (sine waves on both axes) may be used, or the linear timing axis may be employed on the horizontal axis. The most flexible method for frequencies up to 100,000 cycles is the linear timing axis method. The frequency stability of the saw-tooth oscillator running free is not good enough to depend upon for accurate measurements, but when this oscillator is synchronized with a standard-frequency voltage, its frequency stability is the same as that of the standard, and it can be synchronized at any sub-multiple of the standard frequency down to about one-tenth. This allows convenient calibration of a device at many points between one-hundredth of—and ten times a single standard-frequency source, and every point is as accurate as the standard. If a 1000-cycle standard source is used, calibration points between 10 and 10,000 cycles are easily obtained. Using Lissajou figures, calibration points between 100 and 10,000 cycles can be obtained. A frequency standard which is almost universally available is the 60-cycle a-c supply. Since the advent and rapid spread of electric clocks, the frequency of nearly all commercial power is held to a very close tolerance. This allows accurate calibration at frequencies up to about 600 cycles. "*Sync.*" switch S-4 reverses the input to the saw-tooth oscillator and in so doing provides synchronization with impulses of opposite polarity.

Checking Phase Shift—To check phase shift of electrical equipment with the oscillograph, observe the screen pattern with the input to the equipment connected to the "*Horizontal*" jacks and the output from the equipment connected to the input cable. If no phase shift exists, a sloping straight-line image will appear. The internal amplifiers in the oscillograph introduce some phase displacement which must be considered.

CIRCUITS

The schematic arrangement of the entire circuit is shown

An amplifier consisting of two stages constitutes the means of obtaining gain for the signal applied to the vertical deflecting system. The input to this stage is a high-resistance step attenuator connected to provide stepped gain control. An isolation capacitor is made a part of the input circuit

to exclude from the grid any direct current which may be associated with the circuit being observed. The plate, or output tube (RCA-1852) is composed of two elements in series, a resistor and an inductance whose values are so designed as to effect a broad and uniform frequency response in the amplifier stage. Coupling from the amplifier plate to the cathode-ray tube is made through a capacitor.

The amplifier for the signal applied to the horizontal deflecting plates is a single stage. A switch is provided to disconnect the Horizontal Amplifier, thereby applying the voltage to be studied directly to the deflecting plate. Extra contacts are used on the input switch to the horizontal amplifier for feeding in the timing or "saw-tooth" oscillator signal.

A synchronization system is included, as shown in the input circuit of the RCA-884. This is included in the Horizontal Amplifier switch and is described under "Operation." The timing axis oscillator stage, using the RCA-884, is designed to have a frequency range of approximately 4-22,000 cycles, controlled through the "*Range*" switch and "*Frequency*" control. The signal from this oscillator has a "saw-tooth" wave shape, obtained as follows: A d-c potential is applied across a capacitor and resistor in series in the plate circuit of the RCA-884 tube. This voltage charges the capacitor until the ionization potential (plate voltage at which the gas in the tube ionizes) is reached. When the RCA-884 ionizes, the capacitor is short-circuited and the voltage across it drops nearly to zero. The tube immediately deionizes and allows the capacitor to start charging again. In this manner, the voltage across the capacitor has a "saw-tooth" characteristic. The capacitor referred to above is selected by the position of the "*Range*" switch as described in "Operation." With the "*Horizontal Amplifier*" switch on "*Timing*," the voltage across this capacitor passes through the horizontal amplifier to the plates of the cathode-ray tube. The operation of the "*Sync.*" control, in the grid circuit of the RCA-884 is described under "Operation."

The cathode-ray tube has previously been described under "General Discussion of Cathode-Ray Tube." Controls used to alter the intensity, focus and zero adjustments are described under "Operation."

Power required for operation of the instrument is obtained through the power unit from a 110- to 120-volt, 50- to 60-cycle supply. Voltage rectification is accomplished by one RCA-80 and one RCA-879 rectifier tube, one being used full-wave and the other half-wave. One of these tubes supplies plate voltages for the amplifier stages and sweep oscillator, filtered through a reactor-capacitor combination. The other supplies the high voltage to the cathode-ray tube for polarization purposes.

MAINTENANCE

Under ordinary circumstances no adjustments need be made on the instrument but if these are disturbed they can be readjusted only with the use of square wave inputs obtained from a reliable square generator. Normally this means returning the instrument to the factory.

Radiotrons

Under ordinary usage within the ratings specified for voltage supply, tube life will be consistent with that obtained in other applications. The amplifier, oscillator and rectifier tubes will wear in accordance with loss of emission; whereas the determining factor in the life of the cathode-ray tube is the deterioration of the fluorescent screen. It is therefore advisable to avoid leaving a bright, concentrated "spot" on the screen. Also, the image of the phenomena under observation should be removed from the screen when not actually being studied or measured; this item of care will enable a long and useful life to be obtained from the tube.

It is ordinarily not possible to test the Radiotrons in their respective sockets, due to the likelihood of circuit effects causing error. Their removal and check with standard tube-testing apparatus is therefore desirable. Replacement of the questionable tube with one known to be in good condition is another aceptable and definite means of tracing tube troubles.

On the cathode-ray tube, excessive wear and approach to its limit of life is indicated by inability to obtain a satisfactory focus, and also by the screen becoming streaked and spotted. When it becomes necessary to install a new cathode-ray tube, some rotational adjustment may be required to bring the axes of deflection into their proper horizontal and vertical planes. This is accomplished by loosening the screw on the cathode-ray tube shield clamp, rotating the socket as desired, and then tightening the screw.

Fuse Replacements

A small 1½-ampere cartridge fuse is used in the primary circuit of the power transformer. This fuse is intended for protection of the entire power system of the oscillograph, and, therefore, should not be replaced by one having a higher rating, nor be shorted out. A fuse failure should be carefully investigated before making a replacement, since with fuses of accepted quality, there usually will be a definite cause for the breakdown. The cause may originate from a surge in the power-supply line, but the greater percentage of causes may be centered in the apparatus protected, such as shorted rectifier elements, and so forth. Occasionally, a fuse may open from heat generated at one of its clip contacts. These points should therefore be kept clean and in secure contact with the fuse.

Resistance and Continuity Tests

The chassis wiring layout giving color code and physical relation of the parts is shown in Figure 33. All resistor and capacitor values are given to facilitate a rapid and sure test for continuity of circuit and the condition of same. Coils and transformer windings have their d-c resistances shown.

In working on the chassis of the oscillograph, care must be observed to have the power supply completely disconnected. The high voltages associated with the circuits of the cathode-ray tube make it especially dangerous to attempt to handle or work on the chassis while the power is "On."

Care should be exercised in replacing any part that may be found faulty. All wiring associated with the part involved must be removed, and especial attention given to the possibility of damage to other wiring or parts. The relation of wiring and parts should be the same as in the original assembly. The insulation and spacing of the high-voltage leads is very necessary and an important item to be adhered to in servicing of the instrument.

Voltage Measurements

One means of learning the condition of operation and tracing the circuit faults of the oscillograph is by checking the values of the voltages and currents at the Radiotron sockets. The normal values, which can be expected to be found when the instrument is working properly under the specified power rating, are indicated by the Radiotron Socket Voltage Table. In general, the values shown are measured from the socket contacts to ground; however, the heater or filament voltages are a-c and appear between the F-F or H-H clips. All readings given are actual operating values, and do not allow for any errors likely to be caused by current drain of the measuring instrument. Some of the voltages are not measurable with ordinary test equipment; these have been asterisked in the table.

TUBE SOCKET VOLTAGES

Voltages to ground: 20,000 ohms/volt voltmeter. 115 volts applied to primary.

			Stock #158
RCA-879	Plate to ground		—1480
RCA-879	Fil. to ground		AC1190
RCA-80	Plate to ground		AC435
RCA-80	Fil. to ground		+540
RCA-1802	Fil.		—1320
RCA-1802	Grid		—1360 to —1275
RCA-1802	1st Anode		—970 to —1160
RCA-1802	Def. Plate #		+60 to —100
RCA-1802	Def. Plate #		+75 to —85
RCA-1852	Plate		+260
RCA-1852	S 6		+150
RCA-1852	K		+2.25
RCA-1852	Sup.		0
RCA-6C6	2nd Stage	P	
RCA-6C6	2nd Stage	SG	
RCA-6C6	2nd Stage	K	
RCA-6C6	2nd Stage	Sup.	
RCA-6SJ7		P	+210
		SG	+75
		K	+2.8
		Sup.	+2.65
RCA-6C6	1st Stage	P	
RCA-6C6	1st Stage	SG	
		K	
		Sup.	
RCA-6C6	Horiz.	P	
	Amp.	SG	+212
		K	+95
		Sup.	+2.8
RCA-884		P	0
		K	+53
			+7 to 8

TELEVISION ALIGNMENT OSCILLATOR

STOCK NO. 159

TECHNICAL SUMMARY

ELECTRICAL CHARACTERISTICS -

R-F Ranges . . . . . 43-51 mc; 49-57 mc; 65-73 mc; 77-85 mc; 83-91 mc

I-F Ranges -

Picture I-F Channel . . . . . 7.5-15 mc
Sound I-F Channel . . . . . 7.75-8.75 mc

Rejection Frequencies . . . . . 8.25 mc; 14.25 mc

Output Voltages . . . . . Approximately 0.3 and 0.03 volts on each range

Power Supply . . . . . 110-120 volts, 60 cycles, 50 watts

Fuse Rating . . . . . 1 ampere

MECHANICAL SPECIFICATIONS -

Height . . . . . 9-1/4 inches
Width . . . . . 13-3/4 inches
Depth . . . . . 6-1/2 inches
Weight . . . . . 17 pounds

TUBE COMPLEMENT -

2 RCA-6J5 . . . . . Oscillators
2 RCA-1851 . . . . . Amplifiers
1 RCA-6SK7 . . . . . Amplifier
1 RCA-5W4 . . . . . Rectifier
1 RCA-VR105-30 . . . . . Voltage Regulator

DESCRIPTION

The Stock No. 159 Oscillator has been developed to provide an instrument for visual alignment of r-f and i-f circuits in television receivers. By using this instrument together with a cathode ray oscillograph such as the RCA Stock No. 158 or 160, a pattern representing the selectivity curve of the circuits under test is obtained on the oscillograph screen. This is accomplished by periodically sweeping the oscillator frequency through the desired band while observing the resultant output of the receiver second detector, on the oscillograph screen. In this oscillator the output frequency sweeps both upward and downward, that is from low to high, then back to low, repeating this cycle at a rate of 60 cycles per second. A 60-cycle voltage of the proper wave form is provided for horizontal deflection of the oscillograph, resulting in apparent single image operation.

The Stock No. 159 Television Alignment Oscillator consists of two separate oscillators, one for the r-f band, the other for the i-f band. The sweep, or frequency modulation, is accomplished by means of a two section motor driven condenser operating synchronously at 1800 r.p.m. This condenser provides two upward and two downward sweeps in each revolution, resulting in a repetition rate of 60 cycles per second. The condensers are so designed that no connection to the rotating plates is necessary, thus eliminating all brushes and rotating contacts and providing steady, noise free operation. The small section of the rotary condenser sweeps the r-f oscillator frequency through a range of approximately 8 megacycles in each of the five r-f bands. The larger section sweeps the i-f oscillator frequency through a range of approximately 7.5 mc in the picture i-f band and through 1 mc in the sound i-f band.

Each of the two oscillators is connected to a buffer amplifier which couples it to the output cable and smooths out any variations in oscillator output voltage.

The horizontal deflection voltage for the oscillograph is obtained from the 60 cycle line through an adjustable phase shifting circuit in order to compensate for variations in the phase shift of the synchronous motor.

Five controls listed below with their functions, are employed in the operation of the instrument.

1. The Power and Selector Switch is used to turn on the operating power and select either the i-f or the r-f oscillator as desired.

2. The I-F Range Switch selects any one of the following ranges:

Picture I-F Band	7.5 to 15.0 megacycles
Sound I-F Band	7.75 to 8.75 megacycles
Rejection Frequency	8.25 megacycles
Rejection Frequency	14.25 megacycles

3. The R-F Range Switch is used to select one of the following ranges and provides an oscillator frequency sweep from approximately 1 megacycle below to approximately 1 megacycle above the limits of these channels:

44-50 megacycle channel	78-84 megacycle channel
50-56 megacycle channel	84-90 megacycle channel
66-72 megacycle channel	

4. The Phase Control is used to adjust the phase of the oscillograph horizontal deflection voltage.

5. The Phase Reversing Switch is used to reverse the phase of the oscillograph horizontal deflection voltage.

INSTALLATION

To obtain the overall selectivity curve of a television receiver the connections between oscillator, receiver and oscillograph should be made as illustrated in Figure 2, which are as follows:

TO OBTAIN R-F SELECTIVITY CURVES -

1. Connect the r-f output cable to the antenna terminals of the receiver. For receivers using a balanced input circuit connect the cable terminals marked "A1" and "A2" to the two antenna terminals on the receiver and connect the terminal marked "G" to the receiver chassis. *It is important that these connections be as short as possible.* For receivers using a single-ended input circuit connect terminal "A1" to the receiver antenna terminal and terminal "G" to the receiver chassis.

In certain cases where a stronger signal is needed, connections may be made to the terminals marked "HI" and "G". This procedure is useful in aligning a receiver which has been badly mis-tuned, but final alignment should be made as previously outlined above.

2. Connect the oscillograph vertical input terminal to the output of the picture second detector in the receiver.

3. Connect the oscillograph terminal marked "GND." to the receiver chassis.

4. Connect the oscillator terminals marked "HORIZONTAL DEFLECTION" to the horizontal input terminals of the oscillograph marked "HIGH" and "GND.". Do not make this connection to the "SYNC." terminals of the oscillograph.

TO OBTAIN PICTURE I-F SELECTIVITY CURVES -

1. Connect the i-f output cable between the grid of the desired tube of the Picture I-F amplifier and the receiver chassis as illustrated in Figure 3. In most receivers it is necessary to use a capacitor in series with the connection between the cable and the tube grid in order to maintain bias on the tube. Cable terminals marked "LO" and "G" should be used for aligning the first one or two stages and connections "HI" and "G" for the latter stages. The choice of connections depends largely upon which value of input voltage more nearly approximates normal operation of the receiver.

2. Connect the oscillograph vertical input terminal to the output of the picture second detector in the receiver.

3. Connect the oscillograph terminal marked "GND." to the receiver chassis.

4. Connect the oscillator terminals marked "HORIZONTAL DEFLECTION" to the horizontal input terminals of the oscillograph marked "HIGH" and "GND.". Do not make this connection to the "SYNC." terminals of the oscillograph.

ALIGNMENT OF REJECTION CIRCUITS - Make connections as described in "To Obtain Picture I-F Selectivity Curves" and connect a low range, high resistance, voltmeter across the load resistor of the picture second detector. Set the oscillator controls to provide an output signal at one of the rejection frequencies (8.25 mc or 14.25 mc) and adjust the receiver for minimum reading of the meter. When extreme accuracy in setting the rejection points is desired, the oscillator frequencies may be checked by means of the RCA-Stock #157 Piezo-Electric Calibrator and a heterodyne detector or short wave receiver.

TO OBTAIN SOUND I-F SELECTIVITY CURVE - Connections are made similar to those described in "To Obtain Picture I-F Curves", except that the oscillograph input cable is connected to the second detector of the sound channel.

OPERATION

CAUTION - Precautions are necessary in servicing television receivers to avoid coming in contact with the high voltage circuits. Before attempting to use the Alignment Oscillator with a television receiver, the manufacturer's instructions regarding the high voltage portions of the receiver circuit should be carefully read. If possible, the high voltage power supply should be disconnected before attempting to align the receiver. As a further precaution all connections to the receiver should be made and checked before the power is turned on.

In addition to disconnecting the high voltage supply, before taking alignment curves, it will also be necessary to disable the automatic volume control circuits of the receiver and to substitute an adjustable bias supply for controlling the gain of the i-f amplifiers. If this is not done the a.v.c. circuit of the receiver will tend to keep the output constant, thus distorting the selectivity curve. Consult the manufacturer's instructions pertaining to the specific receiver under test, for specific information on how to connect the bias supply.

Technical Information and Service Data Sheets on RCA Television Receivers may be obtained from your distributor.

In general the a.v.c. tube should be removed from its socket and the bias supply connected to the grid return circuits of both sound and picture intermediate frequency amplifiers.

In some receivers it will be found advisable to remove the vertical deflection oscillator tube to eliminate interaction between the sawtooth wave which it generates and the alignment oscillator signal.

It is advisable to connect a capacitor across the second detector load resistor of the picture amplifier in order to prevent high video frequency or intermediate frequency voltages from reaching the oscillograph leads, and thus eliminating the possibility of feedback to the first stages of the intermediate frequency amplifier. The value of capacitance required for this purpose is not critical but should not be large enough to cause distortion of the synchronizing signal. A satisfactory value for use with

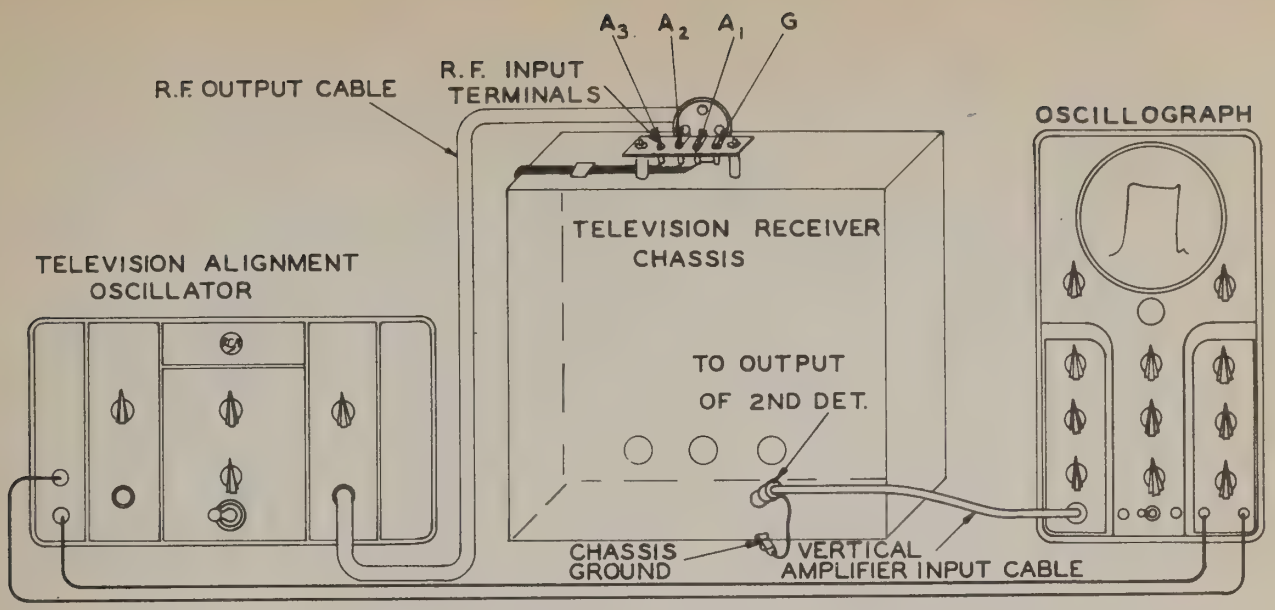


FIGURE 2 - CONNECTIONS FOR R-F ALIGNMENT

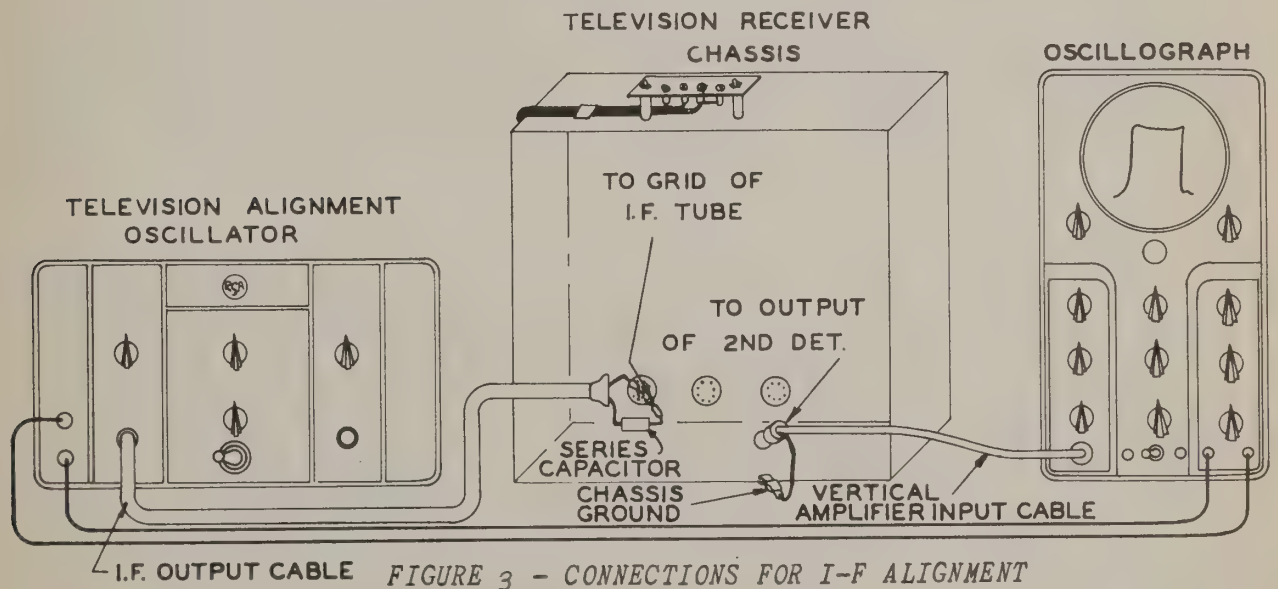


FIGURE 3 - CONNECTIONS FOR I-F ALIGNMENT

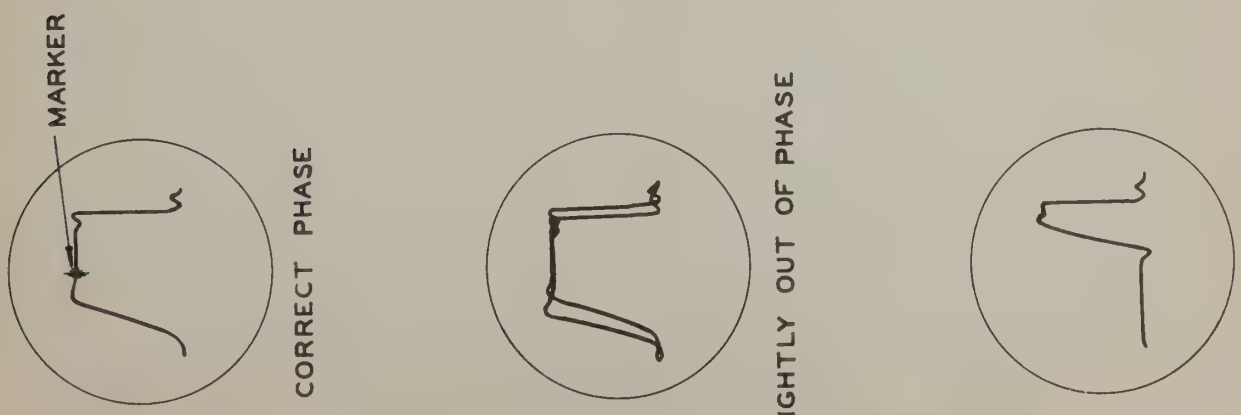


FIGURE 4 - OSCILLOGRAPH TRACES

a detector load resistance of 4000 ohms is approximately 4000 mmfd. For higher values of load resistance use proportionally less capacitance.

After all connections have been made and checked the equipment may be turned on. With the Alignment Oscillator controls set to provide an output signal in the proper frequency band, the bias supply should be adjusted to provide the proper amplitude of output from the receiver second detector. This is, in most cases, approximately 4 to 5 volts peak to peak. For specific information regarding particular receivers consult the manufacturer's service instructions. Adjust the oscillograph vertical gain control to obtain a satisfactory height of pattern on the oscillograph screen with this amount of output from the receiver. The oscillograph horizontal amplifier should be turned "ON" and the horizontal gain control adjusted to obtain an adequate pattern width.

The phase control of the Alignment Oscillator should then be adjusted to provide a single image on the oscillograph screen, by making the forward and return traces coincide as illustrated in Figure 4. Coincidence of the two traces can be obtained in either position of the phase reversing switch; the proper setting resulting in an approximately linear frequency scale with frequency *decreasing* from left to right across the oscillograph screen. Improper setting of the reversing switch results in a frequency scale with frequency *increasing* from left to right, and in the picture i-f band, results in a scale which is extremely cramped at one end. Either position A or position B may be the correct setting for the reversing switch depending upon the phase condition at the moment the motor starts. The proper setting may be determined by inspection of the oscillograph traces obtained with each position of the switch, if the operator is familiar with correct shape which should result. A definite check may be made by the insertion of a marker frequency at the high or low end of any band and observing its position on the oscillograph screen. Correct setting of the phase reversing switch will show a low frequency marker at the right, a high frequency marker at the left.

A marker, as shown in Figure 4, can be inserted at any point on the trace by applying an additional unmodulated signal to the r-f or i-f circuits of the receiver. By varying the frequency of this signal the point at which the marker appears can be moved to any point on the oscillograph trace, thus serving to identify or mark that point on the curve. The frequency corresponding to that point on the trace is the frequency of the external signal. The Stock No. 153 Test Oscillator is extremely useful for marking in the i-f bands. Extreme accuracy in marking may be obtained by using a Stock #157 Piezo-Electric Calibrator and a heterodyne detector or short wave receiver to set the test oscillator frequency. By this means the test oscillator may be set at any multiple of 0.25 mc or of 2 mc to an accuracy of 0.05%. The width of the marker depends upon the high frequency response of the receiver second detector and the oscillograph amplifier. If a capacitor of proper value, as previously suggested is placed across the second detector output a narrow marker will be obtained.

Before attempting to service a faulty receiver the operator should become thoroughly familiar with the procedure outlined above by making these tests on a receiver which is known to be operating properly.

MAINTENANCE

To insure satisfactory operation of the motor, a few drops of S.A.E. 20 oil such as "Gulfcrest A" should be applied once a month.

ADJUSTMENTS - Several screwdriver adjustments are provided in the television Alignment Oscillator for tuning the various circuits and for adjusting the wave form of the horizontal deflection voltage to provide a linear frequency scale. These adjustments are identified in Figures 5, 6 and 7 by means of symbol designation and adjustment numbers which correspond to the following list:

***NOTE** - Adjustments must be made in the order given. If the proper setting for adjustments 3 or 4 falls at either end of the range, adjustment 1 can be changed slightly to correct this condition.*

Adjustment No.	Designation Symbol	Description
1	L6	Picture I-F tuning: Set to provide a sweep range from 7.5 to 15.0 mc.
2	C12	Sound I-F tuning: Set the center of the sweep range to 8.25 mc. Adjustable through opening in back of case.
3	C14	Rejection Frequency tuning: Set for 14.25 mc. Adjustable through opening in back of case.
4	C15	Rejection Frequency tuning: Set for 8.25 mc. Adjustable through opening in back of case.

***NOTE** - The following adjustments must be made in the order given. The sweep ranges may be centered at the proper frequency by using a television receiver or a type 353A Sweep Rectifier and a Marker Oscillator. Using the Marker Oscillator to determine the high and low frequency limits of the sweep range, adjust until the low and high frequency limits are each an equal number of megacycles removed from the center frequency.*

Adjustment No.	Designation Symbol	Description
5	L5	44-50 mc band tuning: Set the center of the sweep range to 47 mc by spreading or contracting the spacing between turns of L5.
6	L1	50-56 mc band tuning: Set the center of the sweep range to 53 mc.
7	L2	66-72 mc band tuning: Set the center of the sweep range to 69 mc.

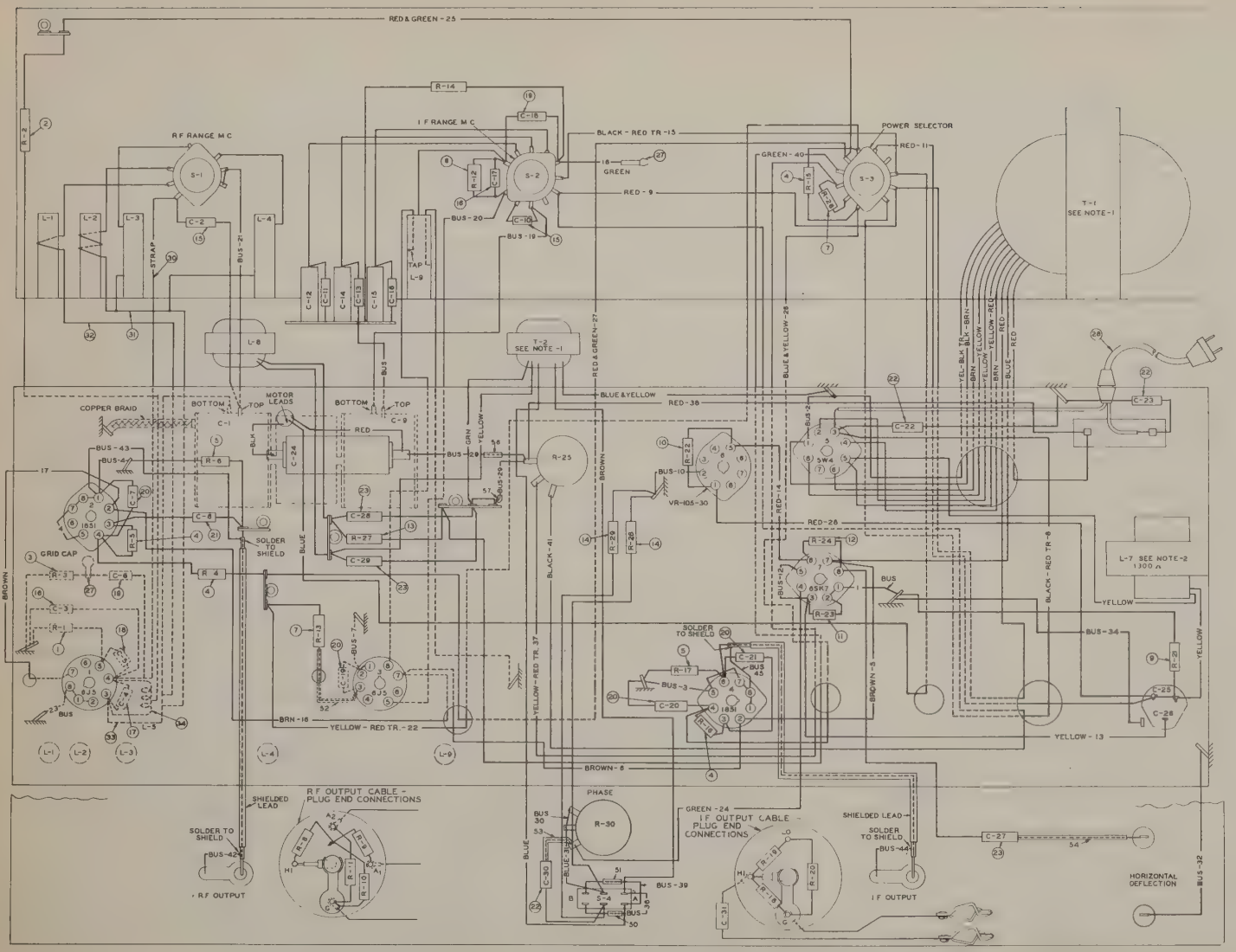
Adjustment No.	Designation Symbol	Description
8	L3	78-84 mc band tuning: Set the center of the sweep range to 81 mc.
9	L4	84-90 mc band tuning: Set the center of the sweep range to 87 mc.
10	R25	Horizontal deflection voltage: Set to provide approximately linear frequency scale on Picture I-F band.

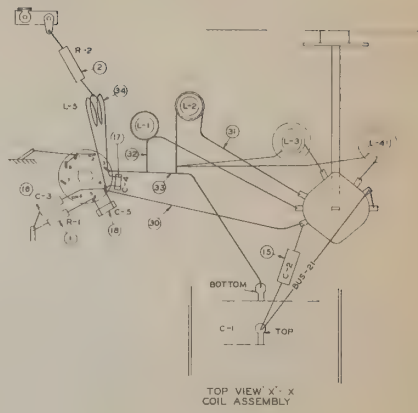
TUBE SOCKET VOLTAGES - Figure 8 shows the approximate voltages applied to the various tubes of the equipment as measured from the socket terminals to chassis ground. Deviations from these values by more than ±20% may be taken to indicate faulty operation. All d-c voltages should be measured by means of a high resistance voltmeter.

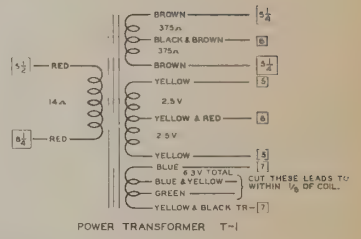
FUSE REPLACEMENT - A small 1 ampere cartridge fuse is used in this instrument. Fuse failure should be thoroughly investigated before making a replacement as this almost invariably indicates a fault in the apparatus.

PARTS LIST

Stock No.	Description	List Price
34593	Cable - R-F output cable complete	
34594	Cable - I-F output cable complete	
MI-96	Cable Wire - R-F & I-F output cable wire 5 foot long	
34164	Cap - Grid connector cap for 1851 Radiotron	
32195	Capacitor - 4.7 mmfd, 400 volts (C6, C18)	
13200	Capacitor - 10 mmfd, 400 volts (C3, C17)	
13002	Capacitor - 12 mmfd, 400 volts (C13)	
33111	Capacitor - 33 mmfd (neg. temp. coeff.) (C5)	
34598	Capacitor - 39 mmfd (neg. temp. coeff.) (C4)	
12723	Capacitor - 56 mmfd, 400 volts (C11)	
13057	Capacitor - 68 mmfd, 400 volts (C2, C10)	
12813	Capacitor - 82 mmfd, 400 volts (C16)	
12720	Capacitor - 100 mmfd, 400 volts (C8)	
12952	Capacitor - 330 mmfd, 400 volts (C7, C19, C20, C21)	
12635	Capacitor - 1000 mmfd, 400 volts (C31)	
30847	Capacitor - 0.05 mfd, 400 volts (C22, C23, C30)	
30860	Capacitor - 0.5 mfd, 400 volts (C27, C28, C29)	
34166	Capacitor - 1 mfd, motor starting capacitor	
34150	Capacitor - 15-15 mfd, 450 volts (C25) 40 mfd, 25 volts (C26)	
13982	Choke - 30 henry, 1300 ohm filter choke (L7)	
34158	Choke - 25 henry, 1000 ohm choke (L8)	
34152	Coil - 50 to 56 mc, R-F Oscillator coil, core and stud (L1)	
34153	Coil - 66 to 72 mc, R-F Oscillator coil, core and stud (L2)	
34155	Coil - 78 to 84 mc, R-F Oscillator strap, core and stud (L3)	
34154	Coil - 84 to 90 mc, R-F Oscillator strap, core and stud (L4)	
34156	Coil - 44 to 50 mc, R-F Oscillator coil (L5)	
34157	Coil - I-F Oscillator transformer assembly (L6)	
34148	Condenser - Double section sweep condenser complete with motor and starting capacitor (C1, C9, C24, M1)	
34149	Condenser - 1 to 12 mmfd (C12, C14, C15)	
18617	Connector - Chassis section of output cable connector	
18618	Connector - Cable section of output cable connector	
14123	Control - 1 megohm phase control (R30)	
34151	Control - 10,000 ohms (R25)	
34165	Escutcheon - Finished front panel escutcheon	
14133	Fuse - 1 ampere line fuse (F1)	
33890	Jack - Red phone tip jack (J1)	
33891	Jack - Black phone tip jack (J2)	
32116	Knob - Control knob	
34761	Resistor - 10 ohms, 1/4 watt (R10)	
34762	Resistor - 56 ohms, 1/4 watt (R9, R11)	
34763	Resistor - 68 ohms, 1/4 watt (R8)	
34764	Resistor - 75 ohms, 1/4 watt (R18)	
34765	Resistor - 100 ohms, 1/4 watt (R6, R17, R20)	
34766	Resistor - 1000 ohms, 1/4 watt (R19)	
34767	Resistor - 2200 ohms, 1/4 watt (R7)	
14421	Resistor - 2700 ohms, 1 watt (R2)	
31960	Resistor - 3900 ohms, 1 watt (R4, R5, R15, R16)	
30146	Resistor - 4700 ohms, 1/4 watt (R24)	
30788	Resistor - 4700 ohms, 1 watt (R27)	
13097	Resistor - 10,000 ohms, 1 watt (R13, R26)	
18474	Resistor - 10,000 ohms, 10 watts (R22)	
12738	Resistor - 27,000 ohms, 1/4 watt (R12)	
13477	Resistor - 27,000 ohms, 1 watt (R28, R29)	
12454	Resistor - 33,000 ohms, 1/4 watt (R1)	
12412	Resistor - 47,000 ohms, 1/4 watt (R23)	
12264	Resistor - 220,000 ohms, 1/4 watt (R21)	
13730	Resistor - 1 megohm, 1/4 watt (R14)	
13601	Resistor - 10 megohms, 1/4 watt (R3)	
18007	Socket - 8 prong octal Amphenol Radiotron socket for RCA-6J5 tubes	
18467	Socket - 8 prong octal wafer type Radiotron socket	
31909	Spring - Panel contact spring	
17507	Switch - Phase reversing switch (S4)	
34160	Switch - R-F band switch (S1)	
34161	Switch - I-F band switch (S2)	
34162	Switch - Power-Selector switch (S3)	
11899	Tip - Phone tip connector (No solder type)	
34159	Transformer - Horizontal deflection transformer (T2)	
9556	Transformer - 110-120 volt, 50-60 cycle power transformer (T1)	

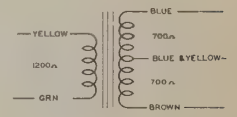






NOTE-1 CUT LEADS OF TRANSFORMER TO REQUIRED LENGTH NUMBERS IN SQUARES INDICATE LENGTH OF LEAD TO EXTEND FROM TRANSFORMER

NOTE-2 CUT THE 14½ LONG YELLOW LEAD OF L-7 TO 5½ AT ASSEMBLY



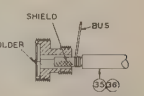


Figure 9—Stock No. 159, Wiring

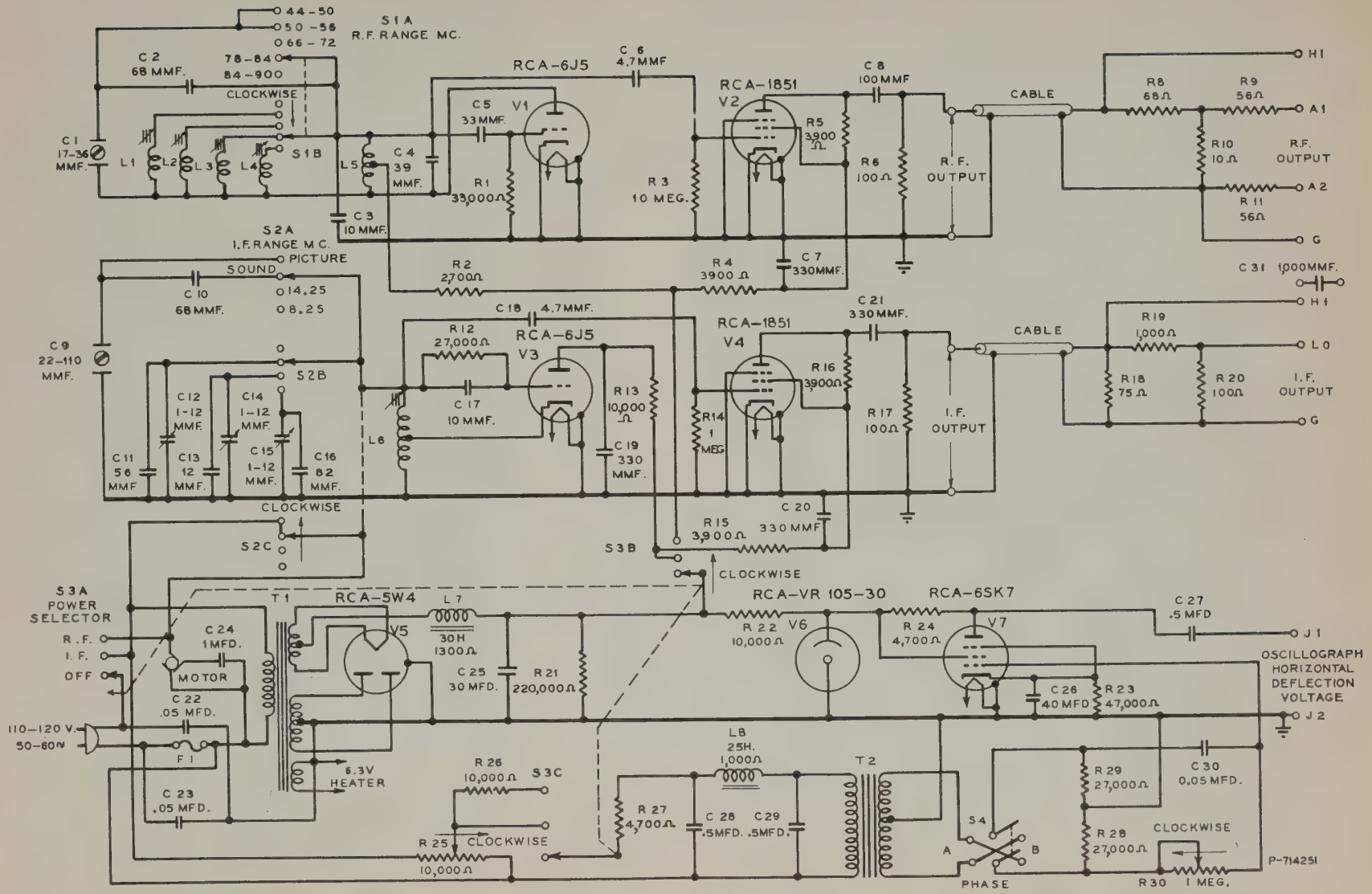
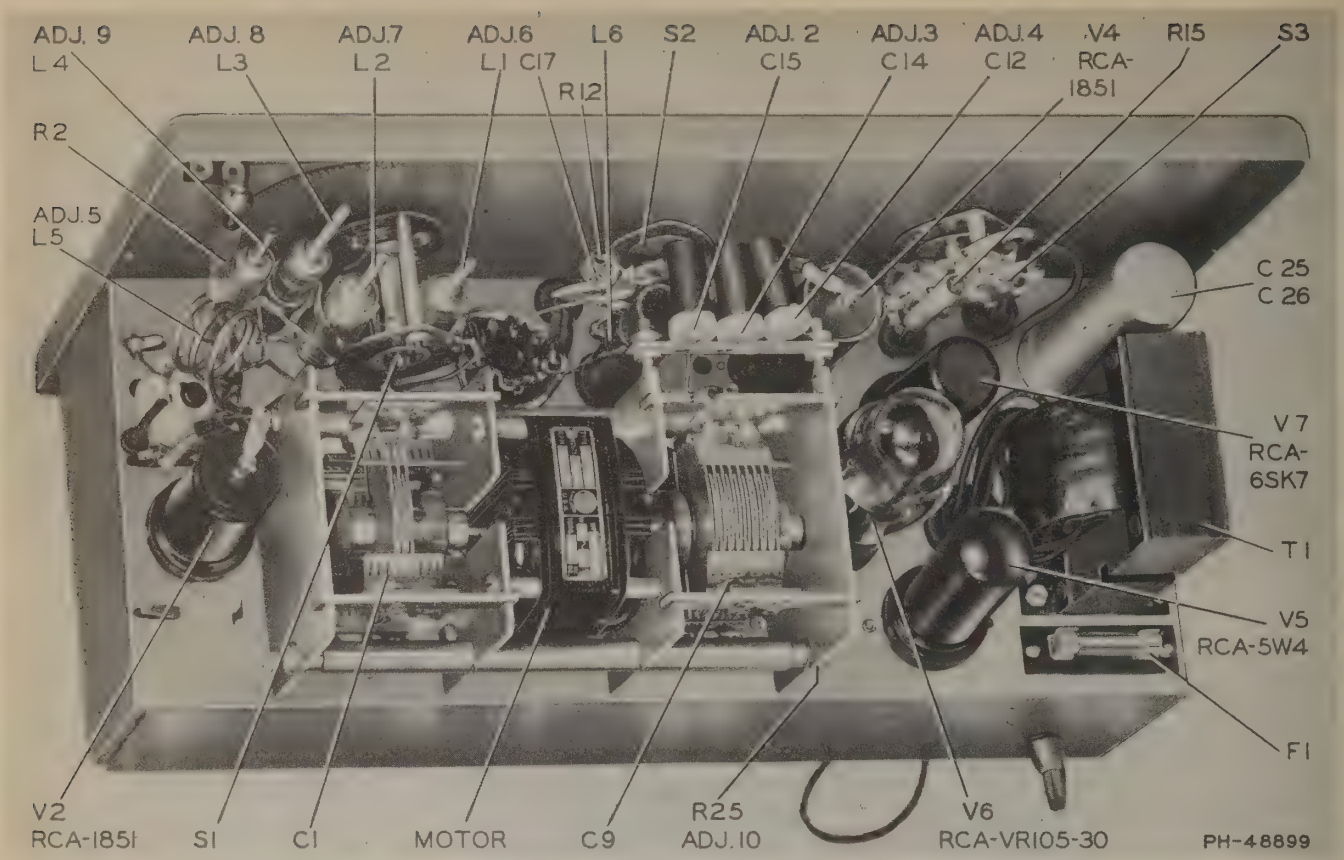
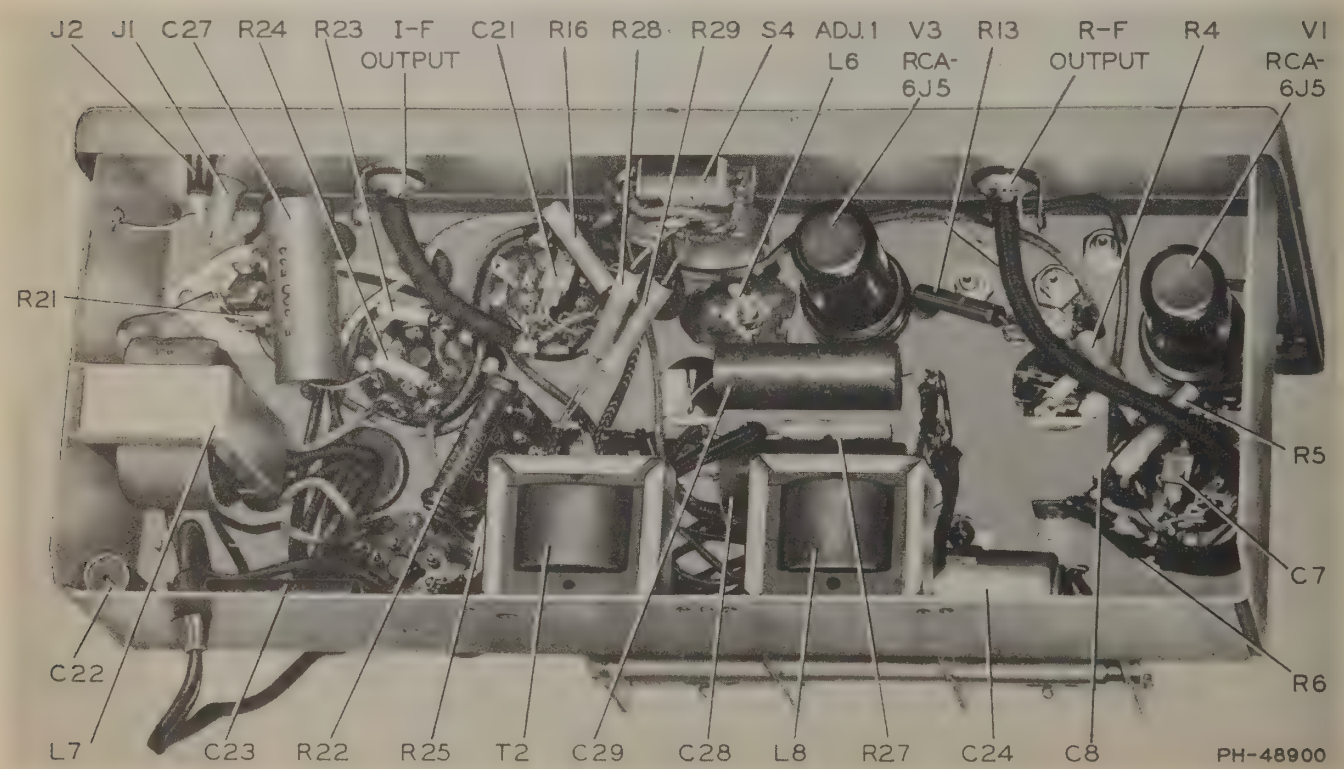
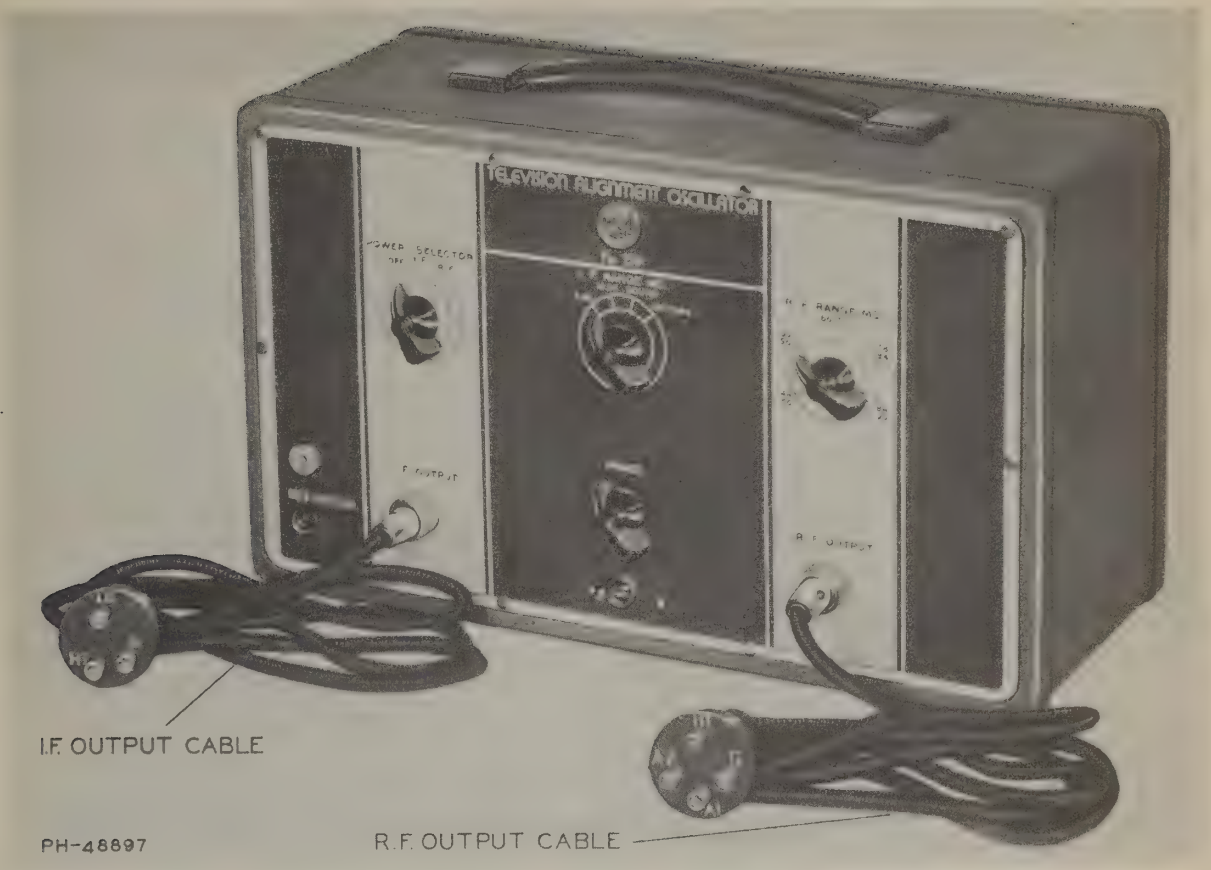
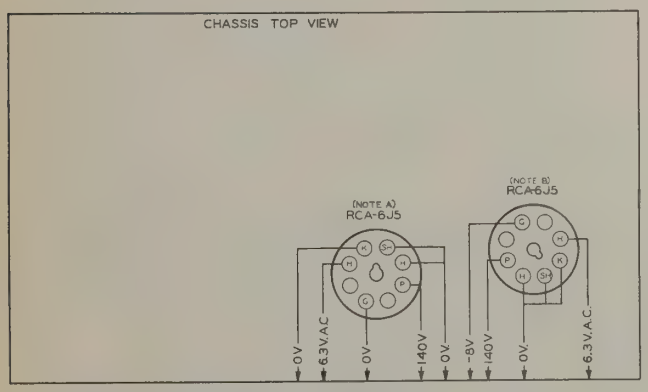


FIGURE 7 - ALIGNMENT OSCILLATOR, SCHEMATIC


ADJ. 9
L4
ADJ. 8
L3
ADJ.7
L2
ADJ.6
L1
C17
L6
S2
ADJ. 2
C15
ADJ.3
C14
ADJ.4
C12
V4
RCA-
1851
R15
S3
R12
R2
ADJ.5
L5
C 25
C 26
V 7
RCA-
6SK7
T1
V5
RCA-5W4
F1
V2
RCA-1851
S1
C1
MOTOR
C9
R25
ADJ.10
V6
RCA-VR105-30
PH-48899


J2
J1
C27
R24
R23
I-F
OUTPUT
C21
R16
R28
R29
S4
ADJ.1
L6
V3
RCA-
6J5
R13
R-F
OUTPUT
R4
V1
RCA-
6J5
R21
R5
C7
R6
C22
L7
C23
R22
R25
T2
C29
C28
L8
R27
C24
C8
PH-48900





NOTE A MEASURED WITH SELECTOR IN IF POSITION
NOTE B MEASURED WITH SELECTOR IN R.F. POSITION.
ALL VOLTAGES MEASURED TO CHASSIS USING HIGH RESISTANCE VOLTMETER.

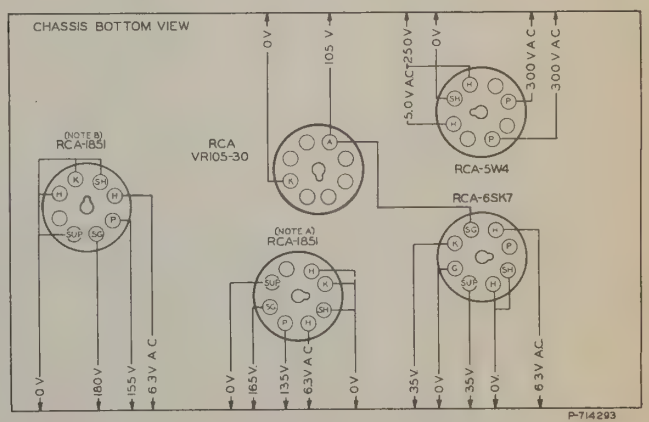


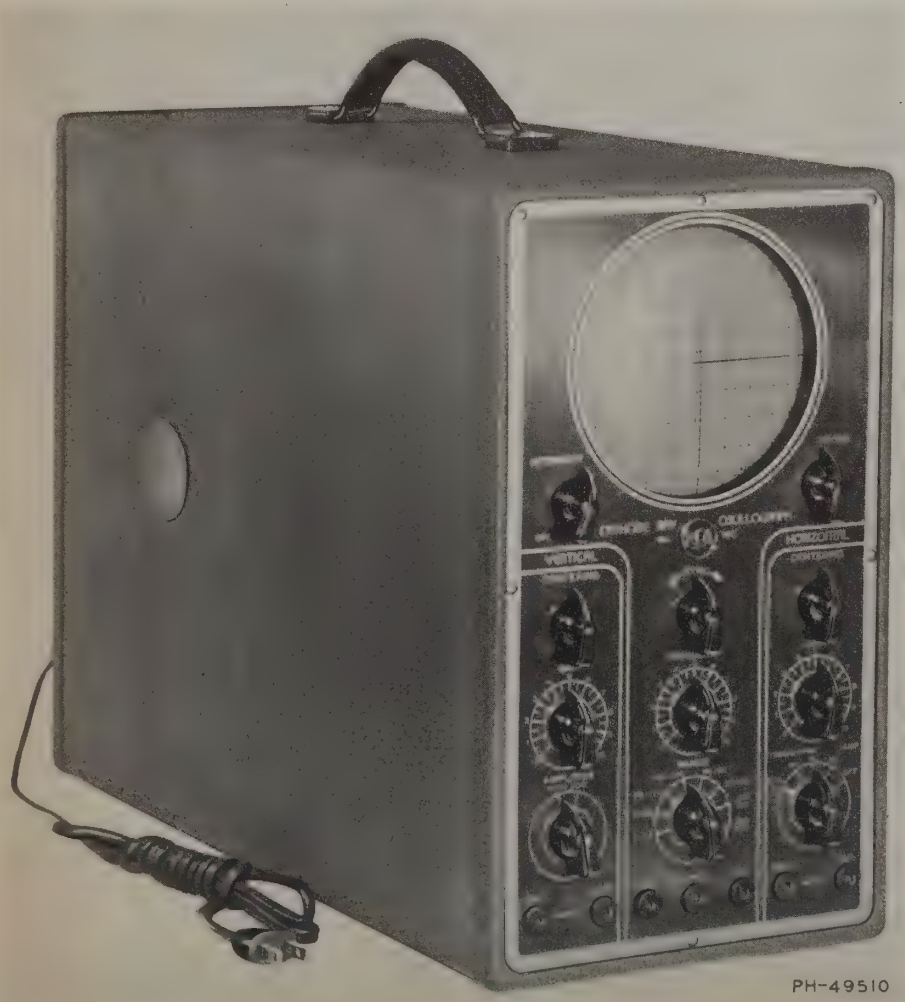
FIGURE 8 – SOCKET VOLTAGE DIAGRAM

Cathode-Ray Oscillograph

Stock No. 160

TECHNICAL SUMMARY

WARNING—A POTENTIAL OF 1500 VOLTS IS PRESENT AT THE CATHODE-RAY TUBE SOCKET AND AT OTHER POINTS ON THE CHASSIS. ALWAYS DISCONNECT THE POWER CORD BEFORE REMOVING THE CHASSIS FROM THE CABINET.



PH-49510

POWER SUPPLY:

Rating ..... 105-125 volts, 50-60 cycles a-c
Power Consumption ..... 55 watts
Fuse Protection ..... 1 ampere

OPERATING LIMITS:

Deflection Sensitivity at Amplifier Inputs (max. gain) .....0.015 rms per inch
Deflection Sensitivity at Cathode-Ray Tube Inputs.....17.5 volts rms per inch
50.0 volts d-c per inch

INPUT CHARACTERISTICS:

(1) Through Either Amplifier
0.5 megohms, approximately 20 mmfd
(2) Without Either Amplifier
2.2 megohms, approximately 40 mmfd

FREQUENCY RESPONSE RANGE OF AMPLIFIERS:

Vertical Amplifier, Sine Wave
3-50,000 cycles
Vertical Amplifier, Square Wave
7-2,000 cycles
Horizontal Amplifier, Sine Wave
5-100,000 cycles
Maximum Signal Input (with Amplifier)
500 volts rms
Frequency Range of Timing Axis
4-22,000 cycles
Maximum d-c Voltage Across Input Pin Jacks ..... 300 volts

TUBE COMPLEMENT:

RCA-6C6 ..... Horizontal Amplifier
RCA-6C6.....1st Stage Vertical Amplifier
RCA-6C6.....2nd Stage Vertical Amplifier
RCA-884 ..... Saw Tooth Oscillator
RCA-1802 P-1 ..... Cathode-Ray Tube
RCA-80 ..... Low Voltage Rectifier
RCA-879 ..... High Voltage Rectifier

OVERALL DIMENSIONS:

Height (including carrying-handle) ..... 14⅜ inches
Width ..... 8 inches
Depth ..... 19½ inches

WEIGHT: (net) ..... 30 pounds

INSTALLATION

Remove the screws at the rear of the case. Withdraw the chassis from the case, feeding the power cable through the hole in the back. Make certain that all tubes are firmly in their sockets and that all grid-cap connections are in place. Unpack the cathode ray tube and install it in its proper mounting and connect the socket, rotating the tube if necessary so that the socket key is located at the top. Replace the chassis in the case and replace the screws at the rear. With the "*Intensity*" control in the extreme counterclockwise ("*Off*") position, plug the power-supply cable into an electrical outlet supplying 105-125 volts at 50-60 cycles. The instrument is then ready for operation.

Due to the extremely low frequency response of the amplifiers in this oscillograph, a considerable amount of axis shift or wabbling of the beam will be experienced when the instrument is operated on a power supply voltage which is unsteady due to changes in load or other factors. Under such conditions an RCA Type TMV-173A Voltage Regulator will eliminate the difficulty.

NOTE: AN INTERLOCK SWITCH, LOCATED AT THE REAR OF THE CHASSIS, OPENS THE POWER CIRCUIT WHEN THE CHASSIS IS REMOVED FROM THE CASE. DO NOT ATTEMPT TO OPERATE THE EQUIPMENT WHILE WITHDRAWN FROM THE CASE AS THE HIGH POTENTIALS USED ARE DANGEROUS.

OPERATION

Controls

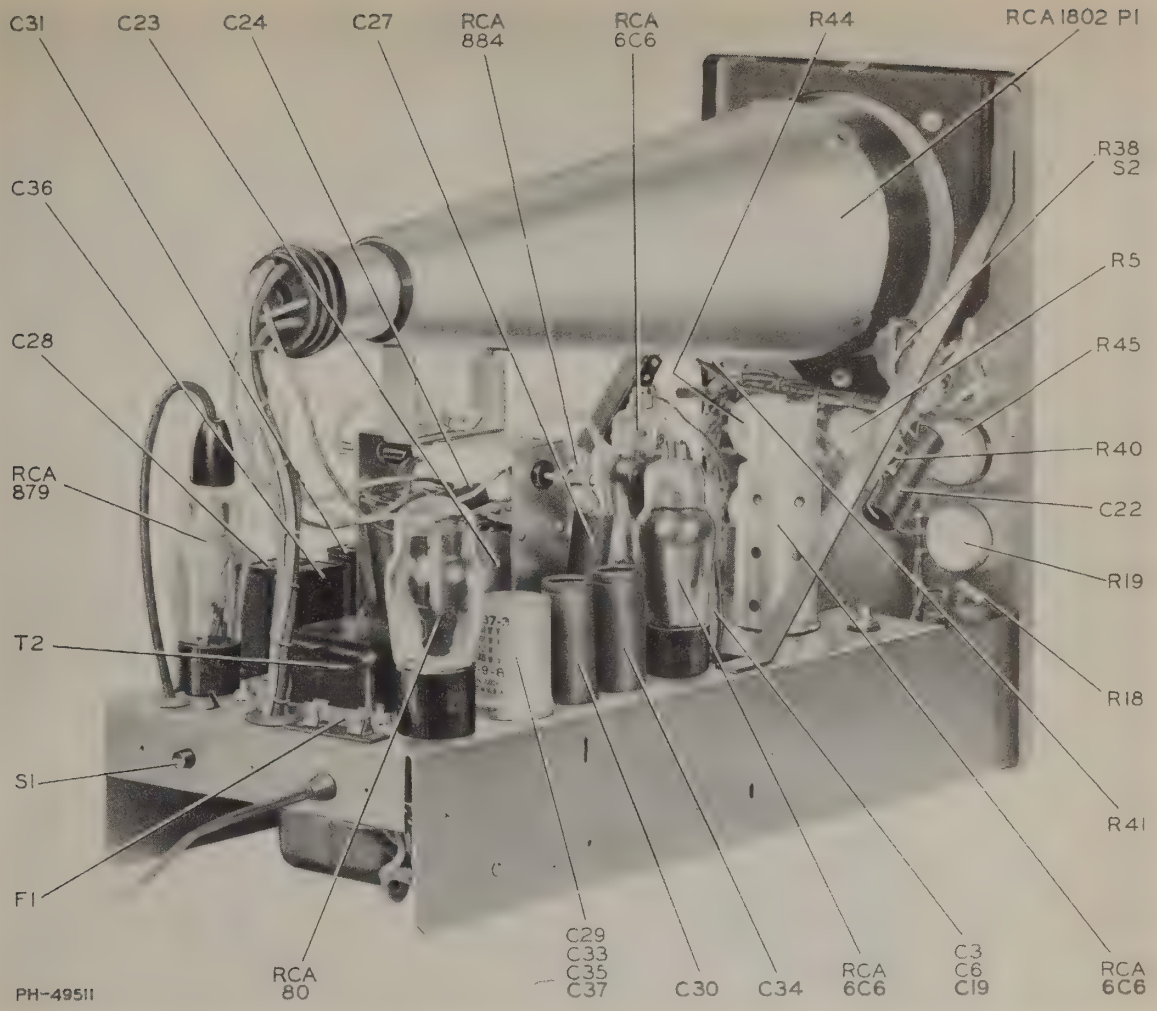
Refer to the schematic and wiring diagrams for the location of circuit units designated by symbols.

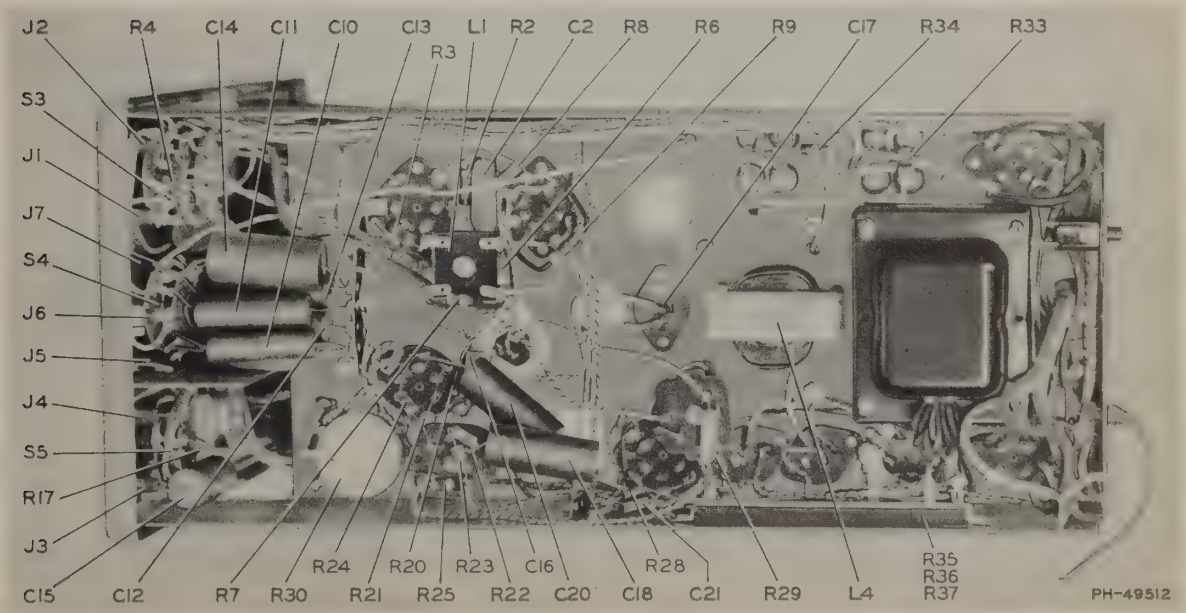
1. "*Intensity*" control (R-38) consists of a potentiometer located in the high side of the high-voltage bleeder and controls the bias on the grid of the cathode-ray tube, which in turn determines the quantity of electrons emanating from the "gun," thus controlling the spot size. The power switch (S2) is attached to this potentiometer. Initial clockwise rotation of this control closes the switch and additional rotation increases the spot size.

2. "*Focus*" control (R-41) is a potentiometer located in the high-voltage bleeder. Its position controls the No. 1 anode voltage, which, with constant voltage on anode No. 2, determines the distance at which the electron beam focuses. In general, for a given "*Intensity*" setting, the "*Focus*" control should be set for maximum distinctness of spot or image.

3. "*Vertical Amplifier*" switch S-5 connects the "*Vertical*" pin jacks to the gain control through an amplifier to the vertical deflecting plates. A condenser is in the input circuit connected to the "*Cap*" jack and is omitted from the input circuit connected to the "*Grid*" jack.

4. "*Horizontal Amplifier*" switch (S-3) has five positions: The amplifier "*On*" and "*Off*" and three "*Timing*" positions. On all "*Timing*" positions


C31
C23
C24
C27
RCA 884
RCA 6C6
R44
RCA 1802 P1
R38 S2
C36
R5
C28
R45
R40
RCA 879
C22
R19
T2
R18
S1
R41
F1
C29 C33 C35 C37
C30
C34
RCA 6C6
C3 C6 C19
RCA 6C6
RCA 80
PH-49511


J2
R4
C14
C11
C10
C13
L1
R2
C2
R8
R6
R9
C17
R34
R33
R3
S3
J1
J7
S4
J6
J5
J4
S5
R17
J3
C15
C12
R7
R30
R24
R21
R20
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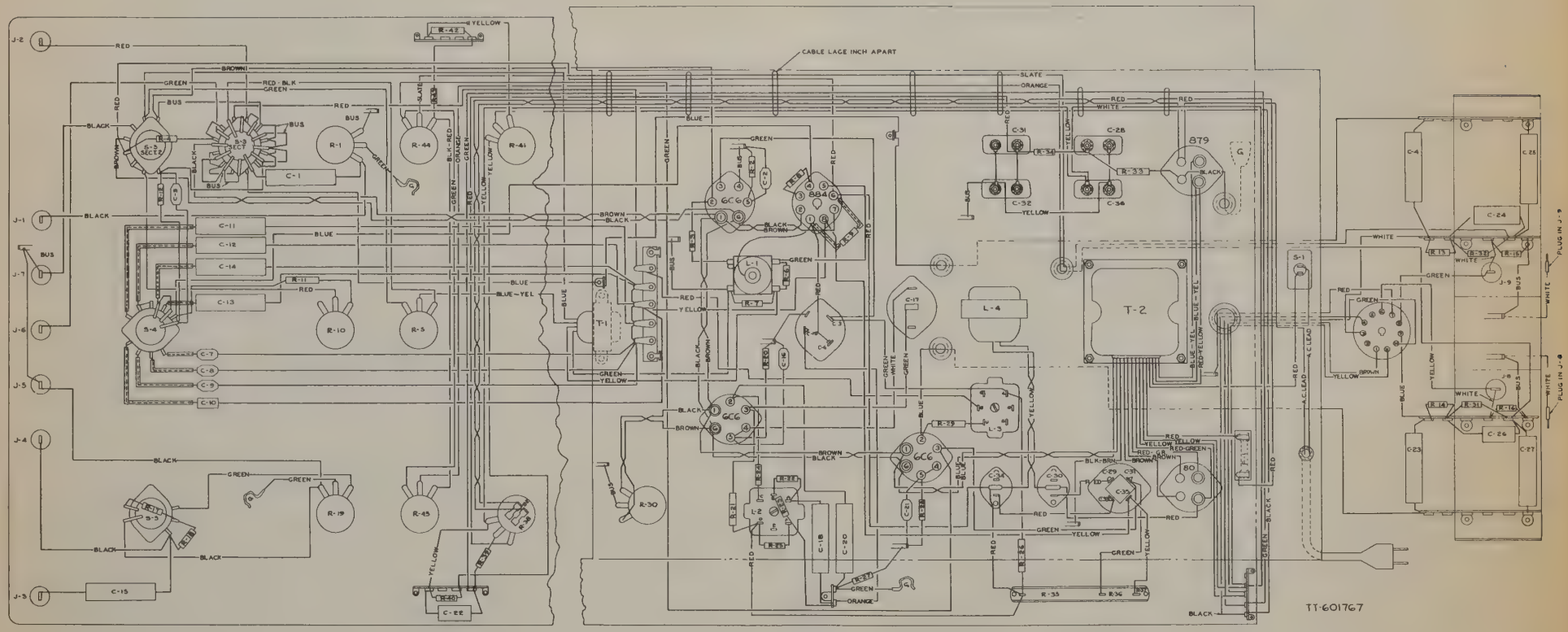
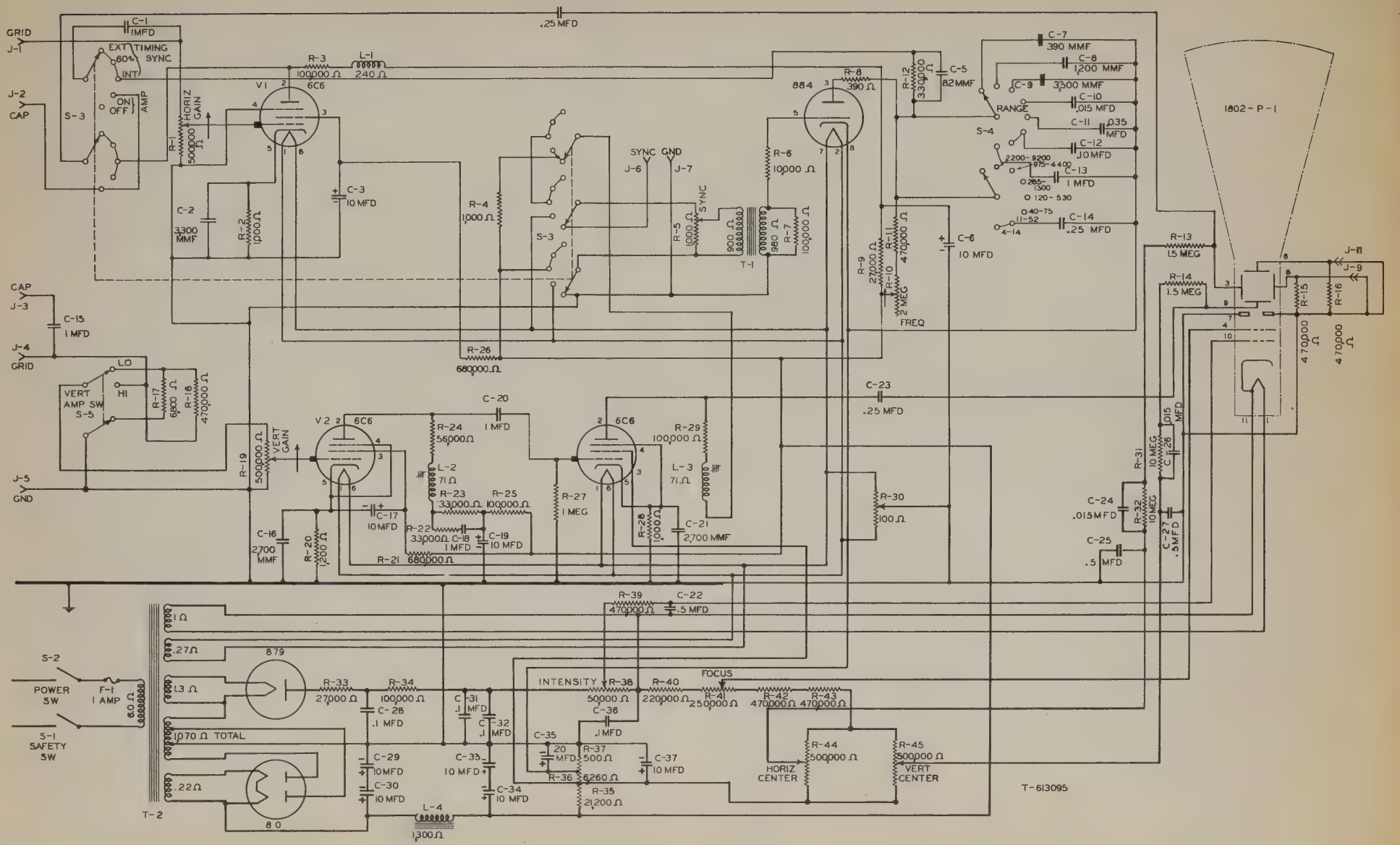
R22
C16
C20
R28
C18
C21
R29
L4
R35 R36 R37
PH-49512



Stock No. 160, Wiring



Stock No. 160, Schematic

the "saw-tooth" or timing-axis oscillator feeds through an amplifier to the horizontal deflecting plates of the cathode-ray tube. At *"On,"* the *"Horizontal"* pin jacks are connected through an amplifier to these deflecting plates while at *"Off,"* the pin jacks are connected straight through to the deflecting plates. In both of the latter two cases, there is a series condenser in the input circuit.

5. *"Vertical Gain"* control (R-19) is a potentiometer on the input circuit of the vertical amplifier. With *"Vertical Amplifier"* switch at *"High"* or *"Lo"* this potentiometer controls the vertical deflection. With the *"Vertical Amplifier"* switch on "Lo," the sensitivity is cut approximately 100 times.

6. *"Horizontal Gain"* control (R-1) consists of a potentiometer located in the input circuit of the horizontal amplifier. With the *"Horizontal Amplifier"* switch set at *"Timing"* or *"On,"* this potentiometer controls the horizontal deflection. Due to the capacity load on this input potentiometer, when operating on *"Timing"* at the higher audio frequencies, linear sweep will not be obtained at all settings of this control. For best results, the control should be set for maximum linearity.

7. *"Range"* switch (S-4) selects one of four timing capacitor values. It thus changes the timing-axis oscillator frequency in steps, giving four ranges approximately as shown on the front panel.

8. *"Freq."* control (R-10) is a rheostat connected in series with the timing condenser. It changes the timing-axis oscillator frequency gradually as it is rotated, and in conjunction with the *"Range"* switch, gives a continuous range between the extremes of frequency.

9. *"Sync."* control (R-5) is a potentiometer used to control the amount of synchronizing voltage fed to the grid of the RCA-884 tube. In general, it should be set as far counterclockwise as is consistent with a locked image, since over-synchronization results in a poor wave-form produced by the timing-axis oscillator.

10. *"Horizontal Amplifier"* switch (S-3) has three timing positions, *"Int,"* *"60,"* and *"Ext."* for synchronization. At *"Int.,"* the voltage drop across resistor R-4 in the plate circuit of the vertical amplifier is fed through the *"Sync."* control and input transformer to the grid of the RCA-884 tube. Thus, the timing-axis oscillator can be synchronized with the signal on the vertical axis at the fundamental frequency or at any sub-multiple, such as ½, 1/3. . . . Synchronization is not effective if it is attempted to operate the timing-axis oscillator at a higher frequency than that of the synchronizing voltage. When set to "60" a portion of the 60 cycle filament voltage is used for synchronization. On *"Ext.,"* the *"Sync."* pin jack is connected to the *"Sync."* control. This allows the use of an external source for synchronizing.

11. The two "centering" controls regulate the amount of d-c potential between the two deflecting plates of each pair, and thereby allows adjustment of the position of the spot or image. There is sufficient voltage across these controls to move the spot approximately two inches on the screen. Start with both of these controls adjusted at about mid-position.

12. There are seven pin jacks on the unit. Voltage impressed across the *"Cap"* and *"Gnd."* pin jacks is applied to the vertical (or horizontal) amplifier through a series capacitor. Voltage impressed across the *"Grid"* and *"Gnd."* pin jacks is applied directly to the grid of the vertical (or horizontal) amplifier. The "Sync." pin jack is used when it is desired to synchronize the timing-axis with some external source. (See 9 above.) The pin jacks marked *"Gnd."* are common ground and the ones otherwise marked are insulated from ground.

TUBE SOCKET VOLTAGES

Voltages to ground: 20,000 ohms/volt voltmeter. 115 volts applied to primary.

		Stock #160
RCA-879	Plate to ground	—1250
RCA-879	Fil. to ground	AC1190
RCA-80	Plate to ground	AC435
RCA-80	Fil. to ground	+495
RCA-1802	Fil.	—1115
RCA-1802	Grid	—1076 to —1135
RCA-1802	1st Anode	—760 to —940
RCA-1802	Def. Plate # 9	—7.5 to +8.5
RCA-1802	Def. Plate # 3	—8.5 to +5
RCA-6C6	1st Stage P	+120
RCA-6C6	1st Stage SG	+105
RCA-6C6	1st Stage K	+3
RCA-6C6	1st Stage Sup.	+3
RCA-6C6	2nd Stage P	+230
RCA-6C6	2nd Stage SG	+110
RCA-6C6	2nd Stage K	+3
RCA-6C6	2nd Stage Sup.	+3
RCA-6C6	Horiz.Amp.P	+212
RCA-6C6	Horiz.Amp.SG	+109
RCA-6C6	Horiz.Amp.K	+3
	Sup.	0
RCA-884	Sweep Osc. P	+53
RCA-884	Sweep Osc. K	+7 to 8

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
12813	Capacitor—82 mmfd. (C5)	32116	Knob—Control knob
13894	Capacitor—390 mmfd. (C7)	13210	Mounting—Fuse mounting strip
13054	Capacitor—1,200 mmfd. (C8)	33893	Plate—Cover plate for case
33858	Capacitor—2,700 mmfd. (C16, C21)	12261	Resistor—390 ohms, ¼ watt (R8)
4881	Capacitor—3,300 mmfd. (C2, C9)	14720	Resistor—1,000 ohms, ¼ watt (R2, R4, R28)
30856	Capacitor—.015 mfd. (C10, C24, C26)		
30857	Capacitor—.035 mfd. (C11)	12267	Resistor—1,200 ohms, ¼ watt (R20)
30848	Capacitor—0.1 mfd. (C12)	12265	Resistor—6,800 ohms, ¼ watt (R17)
18000	Capacitor—0.1 mfd., 1,250 volts (C28, C31, C32, C36)	14559	Resistor—10,000 ohms, ¼ watt (R6)
30860	Capacitor—0.5 mfd. (C22, C27, C25)	33877	Resistor—Voltage divider comprising one 21,600-ohm, one 6,260-ohm, and one 500-ohm section (R35, R36, R37)
30849	Capacitor—0.25 mfd. (C14, C4, C23)		
18416	Capacitor—1 mfd. (C1, C13, C15, C20, (C18)	30409	Resistor—27,000 ohms, ½ watt (R9, R33)
33879	Capacitor—10 mfd. (C17, C30, C34)	12454	Resistor—33,000 ohms, ¼ watt (R22, R23)
33880	Capacitor—10 mfd., 300 volts, 10 mfd., 300 volts, 10 mfd., 150 volts, 20 mfd., 25 volts (C29, C33, C35, C37)	30650	Resistor—56,000 ohms, ½ watt (R24)
		14560	Resistor—100,000 ohms, ¼ watt (R7)
33878	Capacitor—10 mfd. 450 volts, 10 mfd., 450 volts, 10 mfd., 150 volts (C6, C19, C3)	3252	Resistor—100,000 ohms, ½ watt (R25, R34)
		30154	Resistor—100,000 ohms, 1 watt (R3, R29)
12477	Choke—Filter choke (L4)	14583	Resistor—220,000 ohms, ½ watt (R40)
33881	Choke—Horizontal amplifier plate choke (L1)	30784	Resistor—330,000 ohms, ½ watt (R12)
33882	Choke—Vertical amplifier plate choke (L3)	12285	Resistor—470,000 ohms, ¼ watt (R11, R15, R16, R18, R39)
33883	Choke—Vertical amplifier plate choke (L2)	18020	Resistor—470,000 ohms, 1 watt (R42, R43)
33876	Control—100 ohms—Hun balance control (R30)	32727	Resistor—680,000 ohms, 1 watt (R21, R26)
33874	Control—1,000 ohms — synchronizing control (R5)	13730	Resistor—1 meg., ¼ watt (R27)
33863	Control—50,000 ohms—intensity control with power switch (R38)	12201	Resistor—1.5 meg., ¼ watt (R13, R14)
		13601	Resistor—10 meg., ¼ watt (R31, R32)
33864	Control—250,000 ohms—Focus control (R41)	33871	Screen—Calibration screen for cathode-ray tube
33875	Control—500,000 ohms—Vertical gain control (R19)	31769	Socket—4-contact tube socket
		18351	Socket—6-contact tube socket
33859	Control — 500,000 ohms — Horizontal gain control or centering control (R1, R44, R45)	18467	Socket—8-contact octal tube socket
		33001	Socket—11-prong magnal cathode-ray tube socket
33860	Control—2 meg.—Frequency control (Fine) (R10)	33886	Switch—Horizontal amplifier switch (S3)
33892	Escutcheon—Front panel escutcheon	33887	Switch—Range switch (S4)
30926	Foot—Elastic foot for case	33885	Switch—Safety interlock switch (S1)
14133	Fuse—1 ampere line fuse (F1)	33888	Switch—Vertical amplifier switch (S5)
30925	Handle—Carrying handle for case	33884	Transformer—105-125-volt, 60-cycle power transformer (T2)
33891	Jack—Black pin jack (J5, J7, J8, J9)		
33889	Jack—Green pin jack (J1, J4)	14119	Transformer—Synchronizing transformer (T1)
33890	Jack—Red pin jack (J2, J3, J6)		

39-4-10

SIGNALYST

STOCK No. 161

Fundamental Frequency Range	100 kc to 120 mc (10 Bands)
Frequency Calibration Accuracy	± 1%
R-F Output Voltage:	
High Range:	
100 kc to 6 mc	0.2 volt r.m.s. or greater
6 mc to 120 mc	0.1 volt r.m.s. or greater
Low Range:	
100 kc to 6 mc	0.05 volt r.m.s. or greater
6 mc to 120 mc	0.025 volt r.m.s. or greater
Balanced Range:	
100 kc to 6 mc	0.0065 volt r.m.s. or greater
6 mc to 120 mc	0.0032 volt r.m.s. or greater
Internal Amplitude Modulation:	
Frequency	400 cycles ± 20%
Percent. Modulation	Approx. 30%
External Modulation:	
Frequency	60 cycles—5 mc
Input Resistance	680,000 ohms
Percent. Modulation	0 to 90%
Input for 90% Modulation	Approx. 3 volts r.m.s
Audio-Frequency Output	Approx. 3 volts r.m.s
Source Impedance:	
Low R-F Output Range	75 ohms
High R-F Output Range	500 ohms
Balanced R-F Output Range	120 ohms
Audio Output Range	4,300 ohms
Power Supply:	
Line Rating	105-125 volts, 50/60 cycles
Power Consumption	35 watts
Fuse Protection	2 amperes
Tube Complement:	
R-F Oscillator	1 RCA-6J5
Buffer Amplifier and Modulator	1 RCA-6SA7
R-F Voltmeter Rectifier	1 RCA-6H6
Audio Osc. and Heterodyne Detector	1 RCA-6F7
Voltage Regulator	1 RCA-VR150
Power Rectifier	1 RCA-5W4
Dimensions (including feet, handle and knobs)	9¾" high x 8" deep x 14" long
Weight (Net)	21 lbs.
Shipping Weight	24 lbs.

GENERAL DESCRIPTION

The Signalyst is essentially a low-priced signal generator containing an r-f oscillator, a buffer amplifier and modulator stage, and a metering system. Covering a much wider frequency range than heretofore available in test oscillators and signal generators in this price class, this equipment is adaptable to television as well as sound broadcast received servicing. Other outstanding features include:

1. Self-contained heterodyne detector, allowing direct calibration of any external signal within the frequency range of the instrument or direct calibration of the signalyst against an external frequency such as fundamental or harmonics from a crystal oscillator.
2. Broad-band modulation input, permitting modulation with square waves or picture signals for television work, as well as with audio frequencies.
3. Calibrated output voltage attenuator (Figure 5), allowing direct reading of the r-f output in microvolts up to 50,000 microvolts.
4. High output range providing a maximum output of 0.1 to 0.3 volt depending upon frequency.
5. R-F output voltage available at the end of a terminated coaxial cable.
6. Regulated d.c. voltage available for d.c. operation of crystal calibrators, Stock No. 157 and 9572.
7. Voltage regulator in power supply to minimize effect of line voltage fluctuations.
8. Magnetite cores and air trimmers insure excellent dial calibration accuracy initially and provide improved stability under varying conditions of temperature, humidity, etc.

The r-f oscillator covers the frequency range of 100 kc to 120 mc on fundamental frequencies in ten bands. An RCA-6J5 is used as the r-f oscillator in two circuit arrangements: (a) tuned grid with plate feedback from 100 to 14,500 kc, and (b) Colpitts above 14,500 kc. Variable magnetite-core r-f coils and air trimmers are employed in each band which enable accurate initial calibration and realignment in case of replacement of any component in the oscillator circuit. The entire r-f coil and trimmer assembly is enclosed in a copper shield to minimize radiation of the unmodulated radio frequencies.

The output of the r-f oscillator is capacity coupled to the No. 3 grid of an RCA-6SA7 employed as a buffer amplifier and modulator. By means of the associated switch, modulating voltage, either at 400 cycles generated by the internal audio oscillator or at any frequency from 60 cycles up to 5 mc from an external source is introduced on the No. 1 grid of this modulator. The internal modulating voltage when employed is such as to produce approximately 30% modulation. On external modulation, any desired percentage may be obtained by adjusting the value of the applied voltage.

The r-f voltage, either modulated or unmodulated appearing in the plate circuit of the buffer amplifier is applied to the output attenuator and metering circuit. The metering circuit consists of an RCA-6H6 diode rectifier and a d.c. microammeter. The output attenuator consists of a continuously variable control calibrated in microvolts and a shielded resistance—ladder network designed to produce 10 to 1 voltage steps. The last shunt resistor of this network is the terminating resistor of a 5-foot coaxial transmission line. For voltages up to 50,000 microvolts, this portion of the output system is employed with metering done at a fixed level and subdivisions of voltage being read directly by means of the calibrated continuously variable control and the ladder network multiplier. A separate jack is provided for obtaining voltages above 50,000 microvolts and the metering circuit is connected across this jack when the attenuator switch is placed in the "HIGH" position.

In bands X and Y, a peaking coil is used across the buffer output resistor. This arrangement serves to build up an impedance for the r-f circuit and at the same time offers a very low impedance at the video frequencies used for television picture modulation. On band Z, the coil becomes a short length of wire which peaks broadly at the low end of the band. At the high-frequency end of the band, considerably more output may be obtained by rotating the r-f control counterclockwise, thereby short-circuiting the control which causes the circuit to peak broadly at approximately 100 mc.

An RCA-6F7 tube is employed as Audio Oscillator and Heterodyne Detector. For obtaining audio voltage, the triode section of this tube is used in a tuned-grid oscillator circuit. The oscillation transformer has an independent output winding which supplies audio voltage either to the No. 1 grid of the modulator or to an output jack for external uses such as audio testing.

For heterodyne detection, the pentode section of the 6F7 tube is employed as a grid-leak detector and by means of the associated switch, the audio oscillator is converted to an audio amplifier. Radio-frequency voltage from the buffer-modulator is permanently connected to this detector and an input jack on the front panel allows any external signal to be applied to the same grid. The audio beat produced when the two signals are of approximately the same frequency is heard by means of headphones in the plate circuit of the triode section of the tube. An RCA Cathode-ray oscillograph may be substituted for the phones or better still, both the oscillograph and the phones can be used in parallel. This feature is very convenient in obtaining a rapid check of calibration in conjunction with an external standard such as a crystal calibrator (RCA Stock Nos. 157 or 9572) for which regulated d.c. plate voltage is available on front panel.

R-F OUTPUT VOLTAGE DETERMINATION

The r-f output voltage at the end of the coaxial cable is read in microvolts by means of the output attenuator settings. Set the "POWER SELECTOR" switch to "INT. MOD.", "C.W.", or "EXT. MOD." as desired and tune the Signalyst to the desired fre-

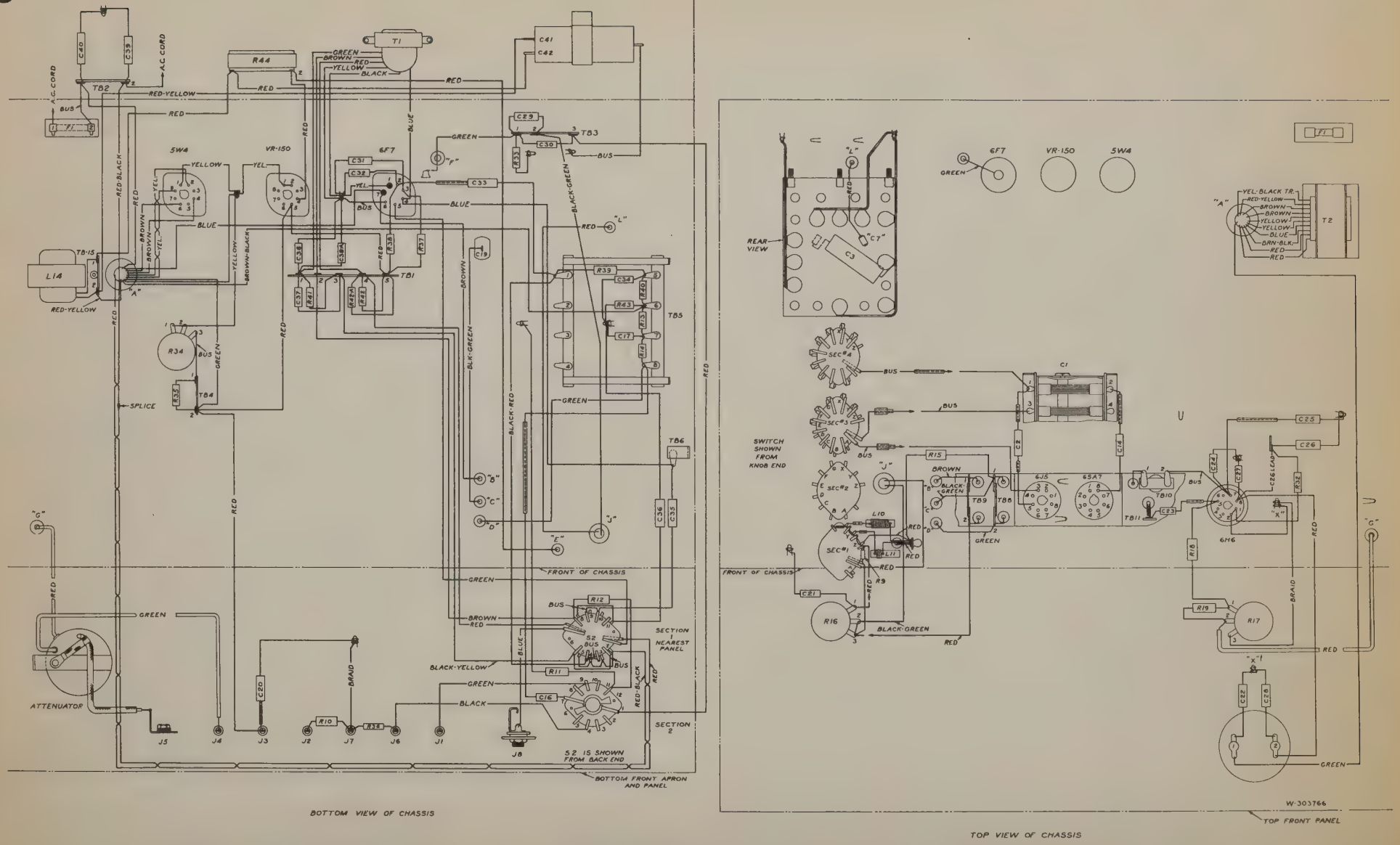


Figure 9—Stock No. 161, Wiring

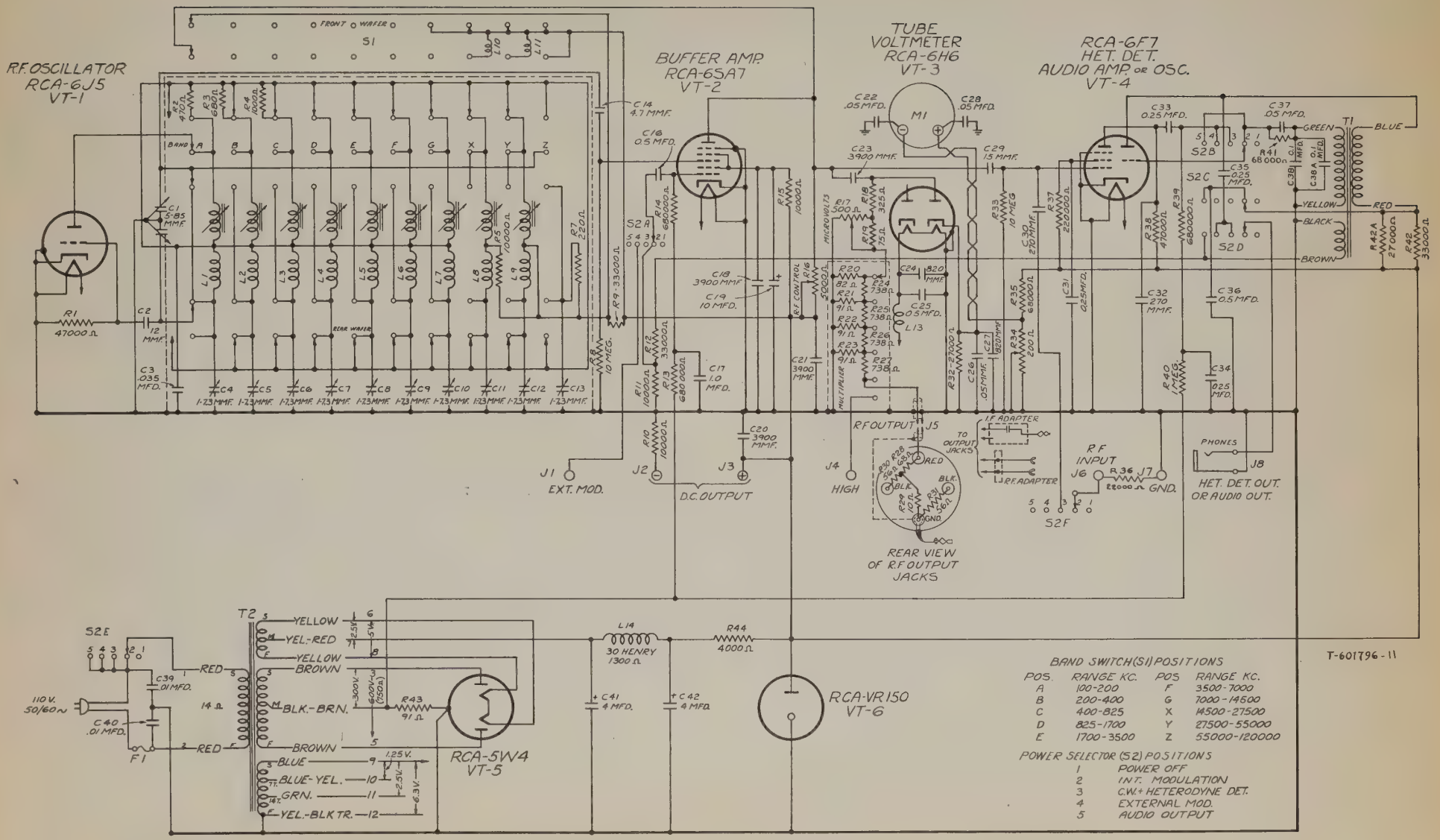


Figure 8—Stock No. 161, Schematic

quency. Next adjust the "MICROVOLTS", and "OUTPUT" attenuators so that the product of their readings when multiplied together is the desired microvolt output. Then turn the "R.F. CONTROL" clockwise until the "VOLTAGE OUTPUT" meter reads on the red line (0.2). The desired microvolt output as read by the "MICROVOLT" and "OUTPUT" controls is now present at the end of the coaxial cable between the flexible ground strap and the red pin jack. The source impedance of this output voltage is 75 ohms. If the two lead adaptor supplied is used for this connection it should be plugged in as shown in Figure 2. During I.F. alignment or other applications where it is desirable to use a series capacitor in the Signalyst output lead the single lead adaptor supplied which contains a 0.01 mfd. capacitor should be plugged in as shown in Figure 4. If it is desired to feed a signal into a circuit which is balanced to ground (such as the transmission line terminals of a receiver) the two lead adaptor should be plugged in as shown in Figure 3 and the two flexible leads from this adaptor connected to the two transmission line terminals. When this type of connection is used the output voltage present across the two balanced output leads will be what is indicated by the "MICROVOLTS" and "OUTPUT" controls multiplied by a correction factor. This factor will vary depending upon the load impedance which is connected across the output leads. In the case of a 100 ohm load impedance the factor is approximately 0.06. The source impedance of this output voltage is 120 ohms.

At some frequencies rotating the "R.F. CONTROL will not bring the "VOLTAGE OUTPUT" meter up to the red line (0.2). At these frequencies rotate the control until the meter reads 0.1. The output voltage will then be one-half the value shown by the "MICROVOLT" and "OUTPUT" controls. Likewise on some bands it may be found impossible to reduce the meter to the red line. In this case set the meter to any convenient scale division. The output voltage will then be the attenuator reading multiplied by the meter reading divided by 0.2.

On band "Z" at some frequencies maximum output indicated by the meter occurs when the "R.F. CONTROL" is rotated counterclockwise. This is a normal condition.

To obtain output voltages in excess of 50,000 microvolts set "OUTPUT" control to position marked "HIGH" and set "MICROVOLTS" control to position "5." The output voltage now appears between pin jacks on front panel marked "GND" and "HIGH." Its value is controlled by the "R.F. CONTROL" and read directly by the "VOLTAGE OUTPUT" meter. The source impedance of this output voltage is 500 ohms. RCA Stock No. 34585 cable will be found very convenient as an output lead for this voltage.

AUDIO OUTPUT VOLTAGE

The 400-cycle modulation voltage can be used externally for audio tests if desired by plugging into the "PHONE" jack and setting the "POWER SELECTOR" switch at the "AUD. OUT." position. This 400-cycle voltage appears across a high impedance (43,000 ohms), reaching a value of approximately 3 volts (r.m.s.) at no load. The output voltage under load obviously will depend upon the ratio of the load and output impedances. It can be measured with a calibrated cathode ray oscillograph or an a.c. voltmeter having an input impedance of at least 0.5 megohms. This 400-cycle voltage has good wave form, being quite free from harmonics.

INTERNAL AND EXTERNAL MODULATION

When the "POWER SELECTOR" switch is tuned to the "INT. MOD." position the r-f output voltage is amplitude modulated approximately 30% by 400 cycles audio voltage generated within the Signalyst and if turned to the "C.W." position the r-f output voltage is unmodulated. When the "POWER SELECTOR" is turned to the "EXT. MOD." position the r-f output voltage will be amplitude modulated by whatever voltage is applied to the pin jacks marked "GND" and "EXT. MOD." This external modulating voltage can be of any frequency from 60 cycles to 5 megacycles, however this modulation frequency should never exceed one tenth of the carrier frequency. One volt will produce approximately 30% modulation and three volts will produce approximately 90% modulation. The load impedance presented by the Signalyst to this external modulating voltage is approximately 680,000 ohms. The percentage of modulation can be checked by using a cathode ray oscillograph, connected to the r-f output of the Signalyst. When making this check a suitable choke (2 to 100 millihenries depending upon frequency) must be connected across the r-f output to by pass the modulating voltage which appears there in addition to the modulated r-f voltage. Otherwise the pattern appearing on the oscillograph will be nonsymmetrical and will give the appearance of downward modulation.

A frequency modulator of the rotating condenser type such as RCA Stock No. 9558 can be connected to the Signalyst if desired. A hole is provided in the back of the case (covered by a metal cap) through which to bring the low capacity cable from the frequency modulator. This cable should be connected in parallel with the tuning condenser within the Signalyst and must be removed in order to restore normal dial calibration.

It is also possible to use an external oscillator of the electronic frequency modulated type and beat its output with the Signalyst output. Both the sum and difference frequencies will then be present and each of these will be frequency modulated over the same band as the external oscillator was modulated.

CHECKING DIAL CALIBRATION

Frequency calibration of the Signalyst dial can be checked with an accuracy of plus or minus 0.05% through the use of RCA Stock No. 157 or 9572 Crystal Calibrators and the heterodyne detector built into the Signalyst. Connections should be made as shown in Figure 5. Care should be taken to use a short lead from the "R-F INPUT" in jack on the Signalyst to the crystal calibrator. If a Stock No. 9572 calibrator is used this lead should either be clipped to the "HI-LO" switch on the calibrator or wrapped several times around its case. The 1 to 1 ratio 110 volt isolating transformer (available from most transformer manufactures) is necessary to eliminate hum which would otherwise be heard in the headphones. The d.c. voltage supplied to the calibrator from the Signalyst comes from the regulated power supply and therefore remains substantially constant regardless of line voltage fluctuations. Turn the "POWER SELECTOR" knob on the Signalyst to positon marked "C.W." and listen in the headphones while changing the frequency of the Signalyst by rotating its pointer and "BAND" switch. A beat note will be heard each time the frequency equals the fundamental frequency or a harmonic of the crystal calibrator. A cathode ray oscillograph connected in parallel with the headphones will be found helpful in determining exact zero beat. In addition to these beat notes others may be heard at various frequencies which are much weaker and are caused by harmonics of the Signalyst beating against harmonics of the crystal calibrator. These unwanted beat notes can usually be eliminated by turning the "R-F CONTROL" counterclockwise. This reduces the level of the r-f voltage generated by the Signalyst and thus reduces the intensity of the unwanted signals.

GENERAL APPLICATIONS

The many outstanding features of the Signalyst such as wide fundamental frequency range (100 kc to 120 mc), built in heterodyne detector, and others open the way for many applications not possible with other types of test oscillators and signal generators.

Some of the most useful applications are listed below and described in a brief and concise manner. No attempt has been made to cover all details and considerations of each application since they are necessarily subject to considerable variation, and therefore to do so would often tend to obscure the main points being brought out.

As the user becomes more familiar with the Signalyst he will undoubtedly find many useful applications in his daily work which are not described here.

RADIO RECEIVER ALIGNMENT

Receiver alignment should always be done in accordance with the instructions given in the manufacturer's service notes. Use "INT. MOD." or "C.W." output from Signalyst as specified and make connections to the radio receiver in accordance with service notes instructions. During i-f alignment the single lead adaptor containing the 0.01 capacitor connected as shown in Figure 4 should be used if connection to i-f grid or first detector grid is specified. During r-f alignment the two lead adaptor connected as shown in Figure 2 should be used. For alignment of loop receivers if a radiation loop is called for it should be connected to pin jacks marked "R-F HIGH" and "GND."

R-F AND I-F GAIN PER STAGE MEASUREMENTS

Connect a Chanalyst (tuned to the frequency at which measurements are being made and with its input attenuators calibrated in microvolts through use of the Signalyst, vacuum tube voltmeter, or other suitable indicator depending on the type of amplifier being measured, across the amplifier output. Use C.W. or "INT. MOD." output from Signalyst, tune it to the amplifier's resonant frequency, connect its output lead to the grid of last amplifier tube, and adjust its output voltage until a suitable amplifier output voltage is obtained. The gain of this stage is the ratio of the amplifier output voltage to the Signalyst output voltage. The Signalyst output lead can then be moved to the grid of the preceeding tube and the change in Signalyst output voltage noted which is required to maintain the original amplifier output voltage. The ratio of these two output voltages from the Signalyst is the amplifier gain between the two grids. In a like manner all stages in the amplifier can be measured. During such measurements the effect of A.V.C. voltage on the amplifier's gain should be considered.

RADIO RECEIVER SENSITIVITY AND IMAGE RATIO

Connect a suitable output indicating devise to the receiver output. Connect the Signalyst output to the receiver antenna input circuit. Use internal modulation on the Signalyst, tune it to the frequency to which the receiver is tuned, and adjust its output voltage until the desired power output is obtained from the receiver. The Signalyst output in microvolts then represents the sensitivity of the receiver. The Signalyst can now be tuned to the image response frequency and its output voltage increased until the same receiver power output is obtained as before. The ratio of the two Signalyst output voltages is the image ratio.

RADIO RECEIVER SELECTIVITY MEASUREMENT

If A.V.C. is employed in the receiver disconnect it and connect in its place a source of fixed bias. Connect a high resistance d.c. voltmeter such as the RCA Rider Voltohmyst Stock No. 163 across the second detector diode load resistor. Use C.W. output from the Signalyst and connect it to the receiver input. Vary the output frequency and voltage of the Signalyst and note the output voltage required at each frequency to maintain normal voltage across second detector diode load resistor. The data thus obtained can be plotted into an over-all selectivity curve.

RADIO RECEIVER OVER-ALL FIDELITY MEASUREMENT

Modulate the Signalyst with a beat frequency audio oscillator such as RCA Stock No. 154. Use a cathode ray oscillograph or any suitable a-c voltmeter across the output of the audio oscillator and keep its output

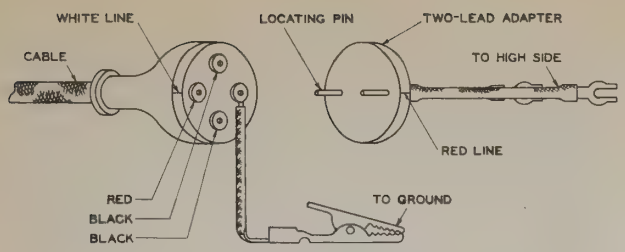


Figure 2—Adapter Connections

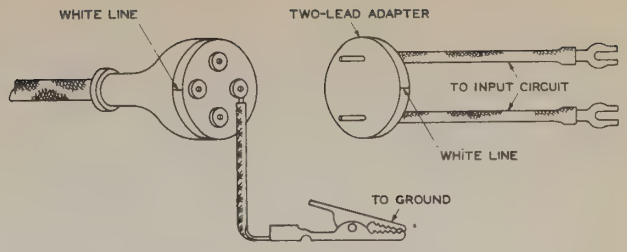


Figure 3—Adapter Connections

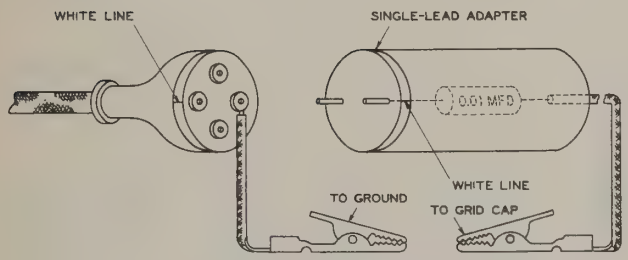


Figure 4—Adapter Connections

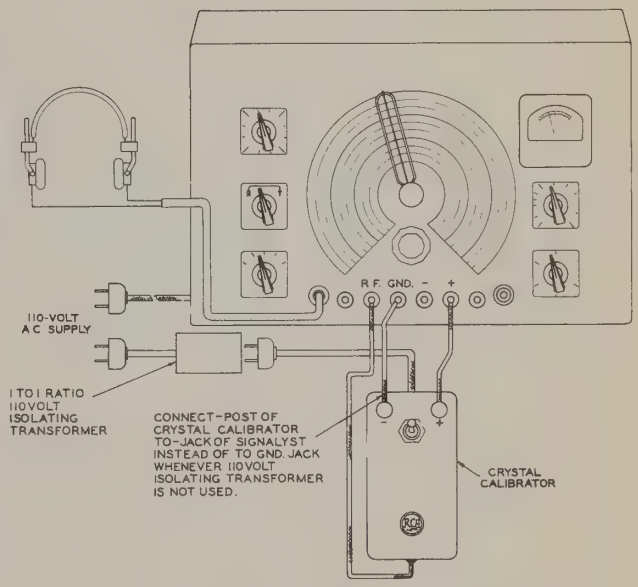


Figure 5—Crystal Calibration Connections

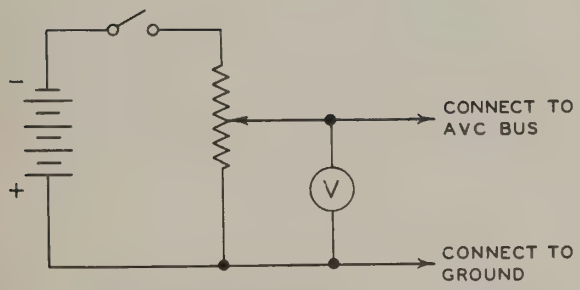
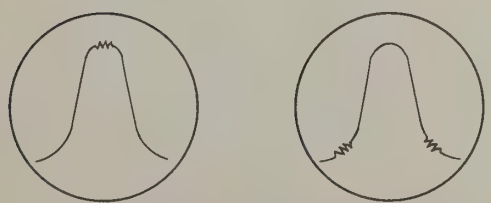


Figure 6—Typical Source of Fixed Bias



THE EFFECT OF MARKER FREQUENCIES ON AN I.F. RESPONSE CURVE VIEWED ON A CATHODE RAY OSCILLOGRAPH SCREEN.

Figure 7—Effect of Marker Frequencies on an I-F Response Curve

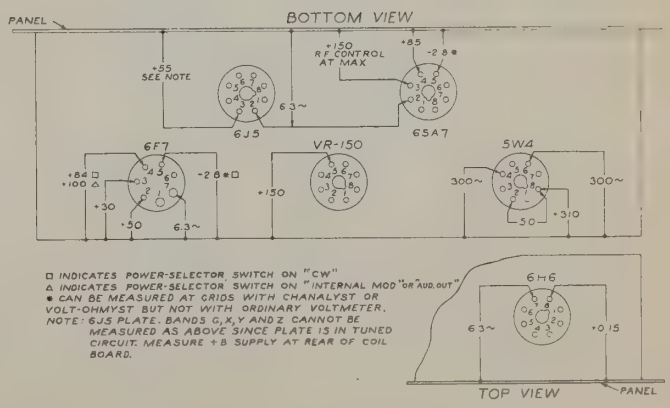


Figure 10—Tube Socket Voltages

voltage constant as the frequency is varied. This will maintain a constant percentage of modulation of the Signalyst r-f output voltage from 60 cycles up to 5 megacycles. Tune the Signalyst to the r-f frequency to which the radio receiver is tuned and connect its output to the radio receiver input. Use approximately 10,000 microvolts output voltage from the Signalyst and reduce receiver sensitivity for normal output. Disconnect the speaker voice coil and replace it with a resistor whose value is the same as the voice coil's impedance. Connect an RCA Cathode Ray Oscillograph or an a-c voltmeter across the resistor. The audio modulating frequency should now be varied and the radio receiver output noted for each frequency. From this data an over-all frequency response curve can be plotted.

RADIO RECEIVER AND OTHER OSCILLATOR FREQUENCY MEASUREMENTS

Turn "POWER SELECTOR" switch to "C.W." position and plug a pair of headphones into the "PHONES" jack. Connect a piece of wire to the "R-F INPUT" jack and couple it loosely to the oscillator circuit. Adjust the "BAND" switch and turn the pointer until zero beat is heard in the phones. The frequency to which the Signalyst is now tuned is the oscillator's frequency. If desired a cathode ray oscillograph can be connected in parallel with the headphones for more accurate indication of zero beat.

A.V.C. CHARACTERISTIC MEASUREMENT

Connect a calibrated RCA Oscillograph or an a-c voltmeter audio output. Use "INT. MOD." output from the Signalyst, connect its output to the radio receiver input, and adjust the Signalyst to the frequency to which the radio receiver is tuned. Vary the Signalyst output voltage and note the audio output voltage developed for each different value of Signalyst output voltage. This data can then be plotted into an A.V.C. characteristic curve.

MEASUREMENT OF SIGNAL VOLTAGE DELIVERED BY ANTENNA TO RADIO RECEIVER

If receiver is equipped with A.V.C. remove it and substitute in its place a source of fixed bias such as shown in Figure 6. Tune in the station whose signal voltage is to be checked. Connect a high resistance voltmeter such as the RCA Rider Voltohmyst across the second detector diode load resistor and note exactly what voltage is developed. Disconnect the antenna and in its place connect the Signalyst. Use "C.W." output and tune it to the frequency on which the station was operating. Vary the Signalyst output voltage until the voltage across the detector diode resistor is the same as it was when the station was tuned in. The output voltage being delivered by the Signalyst is now the same as the voltage the antenna was delivering.

WAVE TRAP ATTENUATION MEASUREMENTS

If receiver is equipped with A.V.C. remove it and substitute in its place a source of fixed bias such as shown in Figure 6. Connect a high resistance voltmeter such as the RCA Rider Voltohmyst across the second detector diode load resistor. Use C.W. output from the Signalyst, adjust it to the frequency to which the wave trap is tuned, and vary its output voltage until a suitable voltage reading is obtained across the diode load resistor. Remove the wave trap and lower the output voltage from the Signalyst until the voltage reading across the diode load resistor is the same as it was with the wave trap connected. The ratio of the two output voltages from the Signalyst is the attenuation of the wave trap.

MEASUREMENT OF ATTENUATION IN ANTENNA DISTRIBUTION SYSTEMS

Connect an RCA Rider Chanalyst Stock No. 162 or a radio receiver not employing A.V.C. but equipped with a suitable output indicator to the output of the distribution system. Use C.W. output from the Signalyst, tune it to the frequency to which the receiver is tuned, connect its output to the input of the distribution system, and adjust its output voltage until a suitable output indication is present on the radio receiver. Then disconnect the distribution system and connect the Signalyst output directly to the radio receiver input and reduce the output voltage from the Signalyst until the radio receiver output is the same as before. The ratio of the two output voltages from the Signalyst is the attenuation of the antenna distribution system.

TEST OSCILLATOR ALIGNMENT

Use "C.W." output from Signalyst and tune its output frequency to the desired test oscillator alignment frequency. Check this tuning carefully by means of a crystal calibrator such as RCA Stock No. 157 or 9572. Connect the test oscillator output to pin jacks on Signalyst marked "GND." and "R-F INPUT." Turn test oscillator dial and range switch until they indicate the frequency to which the Signalyst is tuned. Vary test oscillator alignment adjustment until zero beat is heard in headphones. Keep test oscillator output voltage as low as possible and Signalyst "R-F CONTROL" turned counterclockwise as far as possible to avoir spurious harmonic beat notes. If desired a cathode ray oscillograph can be connected in parallel with the headphones for more accurate zero beat indication.

TELEVISION RECEIVER SENSITIVITY AND IMAGE RATIO MEASUREMENTS

To check the picture channel connect a suitably calibrated cathode ray oscillograph such as RCA Stock No. 158 across the video amplifier output. Connect the Signalyst output to the receiver antenna input circuit. Use internal modulation on the Signalyst, tune it to the frequency producing maximum receiver output, and adjust its output voltage until the desired operating voltage is obtained across the video amplifier output. The Signalyst output in microvolts then represents the picture channel sensitivity. The sound channel sensitivity can be checked in a similar manner by using an output indicator connected to the audio amplifier output and adjusting the Signalyst output voltage until normal audio output is obtained.

The image ratio for each channel (sound and picture) can be checked by noting the necessary voltage required to produce normal receiver output when the Signalyst is tuned to the image frequency and also the resonant frequency. The ratio of these two output voltages from the Signalyst is the image ratio.

TELEVISION RECEIVER SELECTIVITY MEASUREMENTS

If A.V.C. is employed in the receiver disconnect it and connect in its place a source of fixed bias such as shown in Figure 6. Connect a high resistance d.c. voltmeter such as the RCA Rider Voltohmyst across the second detector diode load resistor of the picture channel. Use C.W. output from the Signalyst and connect it to the receiver input. Vary the output frequency and voltage of the Signalyst and note the output voltage required at each frequency to maintain normal voltage across detector diode load resistor. The data thus obtained can be plotted into an over-all picture channel selectivity curve.

TELEVISION I-F AMPLIFIER GAIN PER STAGE AND FREQUENCY RESPONSE MEASUREMENTS

Connect a suitable vacuum tube voltmeter across the amplifier output. Use C.W. output from Signalyst, tune it to a frequency within the i-f range which produces maximum output, and connect its output lead to grid of the last i-f amplifier tube. Adjust Signalyst output voltage until suitable amplifier output is obtained. Gain of this stage is the ratio of the amplifier output voltage to the Signalyst output voltage. The Signalyst output lead can then be moved to the grid of the preceding tube and the change in Signalyst output voltage noted which is required to maintain the original d.c. voltage across the diode resistor. The ratio of these two output voltages from the Signalyst is the amplifier gain between the two grids. In like manner all stages in the amplifier can be measured. However all should be measured at the same frequency. A number of over-all measurements made in this manner at different frequencies will provide the necessary data from which an over-all frequency response curve can be plotted.

TELEVISION VIDEO AMPLIFIER GAIN PER STAGE AND FREQUENCY RESPONSE MEASUREMENTS

Connect a suitable vacuum tube voltmeter (having approximately the same input capacity as the output load) across the output of the video amplifier with the output load disconnected. Use C.W. output from Signalyst, tune it to a frequency within the video range, and connect its output lead to grid of last video amplifier tube. Adjust Signalyst output voltage until suitable amplifier output is obtained. Gain of this stage is the ratio of the amplifier output voltage to the Signalyst output voltage. The Signalyst output lead can then be moved to the grid of the preceding tube and the change in Signalyst output voltage noted which is required to maintain the original amplifier output voltage. The ratio of these two output voltages from the Signalyst is the amplifier gain between the two grids. In like manner all stages in the amplifier can be measured. However, all should be measured at the same frequency. A number of over-all measurements made in this manner at different frequencies will provide the necessary data from which an over-all frequency response curve can be plotted.

TELEVISION RECEIVER ALIGNMENT MARKING OSCILLATOR

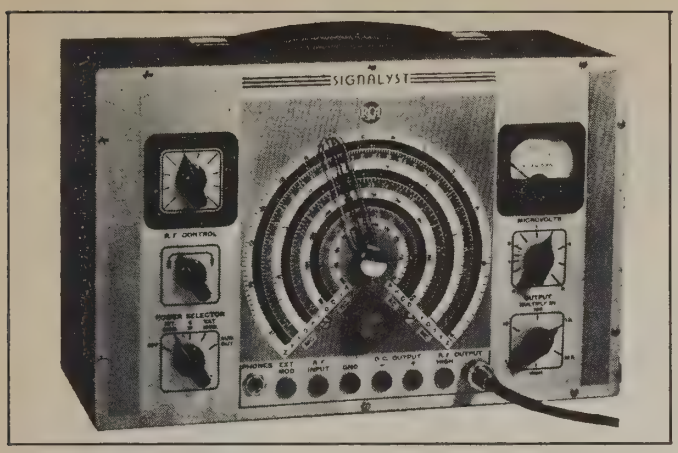
Use C.W. output from Signalyst and tune its output frequency to the desired marking frequency. Check this tuning carefully by means of an RCA crystal calibrator. Couple the Signalyst output to the RCA Television Alignment Oscillator Stock No. 159 output through a small variable capacitor (approximately 2-20 mmf.) and proceed with receiver alignment. As the Signalyst dial is turned the marker will move on the response curve seen on the oscillograph screen and the place on the response curve where the marker is seen always represents the frequency to which the Signalyst is tuned. This permits a very accurate check to be made of band width, peaks, and important points of the response curve.

TELEVISION RECEIVER LOCAL OSCILLATOR ADJUSTMENT

Use C.W. output from Signalyst and tune its output frequency to the desired local oscillator frequency. Check this tuning carefully by means of a crystal calibrator such as RCA Stock No. 157. Connect a short wire to the "R-F INPUT" jack and couple it loosely to the local oscillator in the receiver. Adjust the local oscillator frequency until it produces a zero beat with the Signalyst. This zero beat will be heard in the headphones plugged into the "PHONES" jack and if desired a cathode ray oscillograph can be connected in parallel with the headphones for more accurate indication. Use of this method makes possible adjustment of the local oscillator to the proper frequency with the great accuracy essential to proper television receiver performance.

TELEVISION RECEIVER REJECTOR CIRCUIT ADJUSTMENTS

Use internal-modulation and connect the Signalyst output to the grid circuit of the tube preceding the rejection circuit. Connect an RCA Cathode ray oscillograph to the video amplifier output. Tune Signalyst to rejection frequency and check this tuning carefully by means of a crystal calibrator. Increase Signalyst output voltage until a convenient image



Stock No. 161, Signalyst

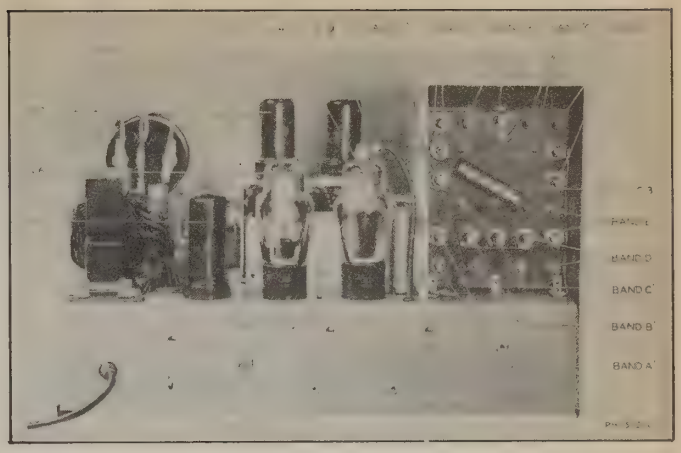


Figure 11—Signalyst Rear View

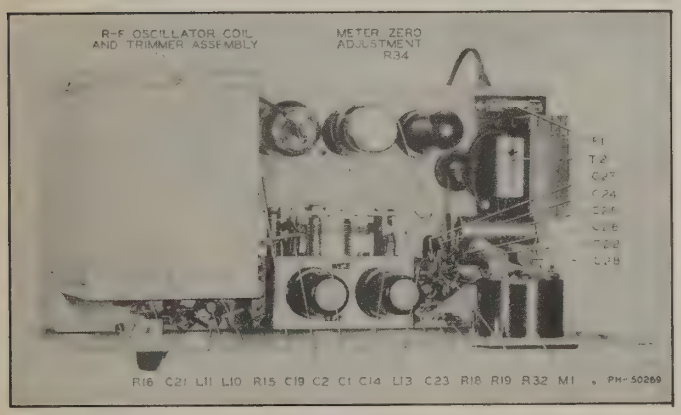

R-F OSCILLATOR COIL AND TRIMMER ASSEMBLY
METER ZERO ADJUSTMENT R34
R16 C21 L11 L10 R15 C19 C2 C1 C14 L13 C23 R18 R19 R32 M1
PH-50269

Figure 12—Signalyst Top View

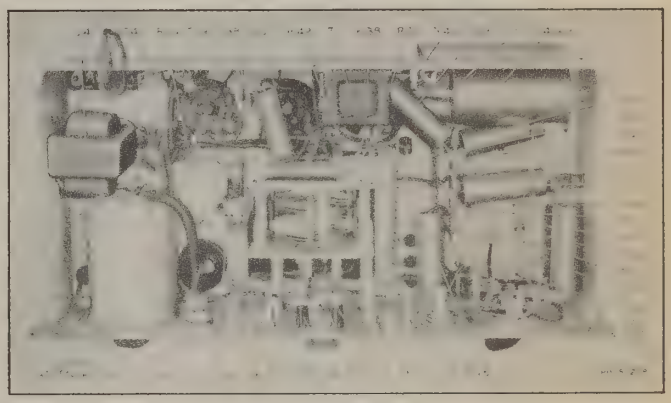


Figure 13—Chassis Bottom View

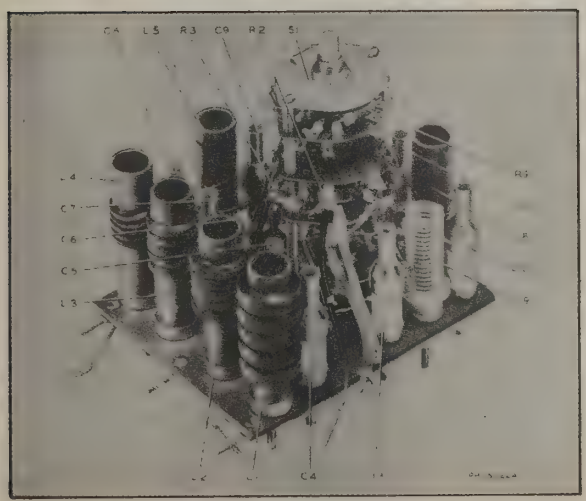


Figure 14—Band Switch and Trimmer Assembly

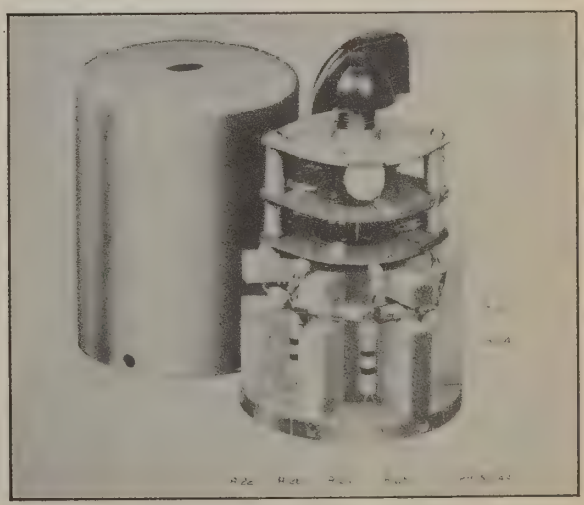


Figure 15—Output Attenuator

appears on oscillograph screen. Adjust rejector circuits for minimum output as observed on cathode ray oscillograph. If necessary increase voltage output of Signalyst while making this adjustment.

TELEVISION VIDEO R-F CARRIER SOURCE

Tune Signalyst to desired r-f carrier frequency and turn its selector switch to "EXT. MOD." position. Connect "EXT. MOD." pin jack to suitable square wave generator, picture generator, or any available source of video frequency. Signalyst output can now be used for checking the picture channel of television receivers.

TELEVISION SOUND R-F CARRIER SOURCE

Tune Signalyst to desired r-f carrier frequency and turn its selector switch to "EXT. MOD." position. Connect "EXT. MOD." pin jack to suitable source of audio frequency voltage such as microphone, record player, radio receiver, audio oscillator, etc. Signalyst output can now be used for checking the sound channel of television receivers.

APPLICATIONS OF SIGNALYST IN CHECKING FREQUENCY MODULATION RECEIVERS

The procedure given herein for several of the applications for the Signalyst to radio and television receivers can also be followed for similar applications to frequency modulation receivers. Some variation will be found in the procedure recommended by various manufacturers in their service notes and the manufacturer's recommendations should in all cases be followed.

The procedure under headings "RADIO RECEIVER ALIGNMENT," "RADIO RECEIVER AND OTHER OSCILLATOR FREQUENCY MEASUREMENTS," "TELEVISION I-F AMPLIFIER GAIN PER STAGE AND FREQUENCY RESPONSE MEASUREMENTS," and "TELEVISION RECEIVER LOCAL OSCILLATOR ADJUSTMENT" can be followed exactly as specified.

The procedure under "RADIO RECEIVER SELECTIVITY MEASUREMENT" can be followed as given except that the RCA Rider Voltohmyst must be connected to one-half of the discriminator output. Likewise when following the procedure under "TELEVISION RECEIVER ALIGNMENT MARKING OSCILLATOR" the sweep oscillator must be such that it will cover the proper frequency band.

When the manufacturer's service notes specify alignment by the output meter method the Signalyst will be found to be an excellent oscillator for use in this application.

POINTER ADJUSTMENT AND RE-ALIGNMENT

At the maximum capacity (low-frequency) end of the dial scale is an engraved radial line on band "Z" for setting the pointer. In the event of slippage of the pointer, the set screws should be loosened, the condenser rotated to the stop in the maximum capacity position by means of the fine tuning control, the pointer set to the engraved line and locked in place by tightening the two set screws in the pointer hub.

IMPORTANT: DUE TO THE HIGH-RATIO GEAR DRIVE EMPLOYED, IT IS VERY IMPORTANT THAT IN THE ABOVE OPERATION THE CONDENSER SHALL BE ROTATED AGAINST THE STOP WITH THE FINE CONTROL KNOB ONLY. THIS FINE CONTROL BEING A BALL-BEARING REDUCER (FRICTIONAL DEVICE) WILL SLIP WHEN CONDENSER REACHES STOP, THUS AVOIDING THE POSSIBILITY OF DAMAGING THE CONDENSER OR TEETH OF THE GEAR TRAIN BY UNDUE PRESSURE.

In the event of replacement of any oscillator component, the band affected (or all bands if the replacement is common to all) should be retrimmed to return the dial scale to its former calibration. By removing three drive screws at the rear of the shield can on the coil assembly, the back plate of the shield can may be removed. The trimmer capacitor and iron-core adjustments are then available. A suitable trimmer adjustment tool and a fiber screwdriver should be available for this work. The bands are properly aligned by first adjusting the iron core for zero beat with a standard signal at the low-frequency end of the band and then adjusting the trimmer capacitor for zero beat with a standard signal at the high-frequency end of the band. This process must be repeated as the trimmer will affect the low-frequency end slightly.

This procedure is repeated on all bands except "Z." On band "Z" there is no physical r-f coil, the leads to the tuning condenser and associated switch being employed as the coil. There is a high-frequency trimmer adjustment on this band but inductance adjustment is accomplished by bending the solid-wire lead from the rear section of the tuning condenser to the switch. Bending the lead closer to the braid lead on the front section of the condenser decreases the inductance, conversely, bending this lead away from the braid lead increases the inductance. If care is taken to preserve the original placement of the lead, it should never have to be readjusted, the trimmer capacitor taking care of all minor adjustments.

ADJUSTMENT OF METER ZERO CONTROL

The voltage developed across potentiometer R34 is employed to buck out the initial direct current in the RCA-6H6 diode circuit. When this tube ages or is replaced, it may be necessary to reset this control.

THIS AGEING PROCESS MAY SOMETIMES CONTINUE FOR A PERIOD OF TIME UP TO A MAXIMUM OF 100 HOURS AND WILL IN MOST CASES CAUSE THE METER TO READ TOO LOW OR SOMEWHAT BACKWARDS IF THE R-F CONTROL IS TURNED ALL THE WAY COUNTERCLOCKWISE. WHENEVER THE SIGNALYST OUTPUT APPEARS TO HAVE FALLEN BELOW WHAT IT SHOULD BE THIS IS THE FIRST THING THAT SHOULD BE CHECKED. In such cases, allow the equipment to become thoroughly warmed up (3 to 5 minutes' operation), remove the oscillator tube (RCA-6J5) from its socket so that no r-f voltage is being fed to the diode circuit and adjust R34 for zero indication on the meter. The mechanical zero setting of the meter itself should be checked previous to this operation.

A small percentage of RCA-6H6 tubes may be found which cannot be zeroed with the voltages existing across control R34. It has been found however that such tubes would not have a satisfactory curve, even if zeroed with a higher voltage and are therefore not satisfactory for this service.

PARTS LIST

SYMBOL	DESCRIPTION	Stock No.
R-1	Resistor—47,000 ohms, ± 10%, ¼ watt	12412
R-2	Resistor—470 ohms, ± 10%, ¼ watt	30546
R-3	Resistor—680 ohms, ± 10%, ¼ watt	12262
R-4	Resistor—1,000 ohms, ± 10%, ¼ watt	14720
R-5	Resistor—10,000 ohms, ± 10%, ¼ watt	14559
R-7	Resistor—220 ohms, ± 10%, ¼ watt	14561
R-8, R-33	Resistor—10 megohms, ± 10%, ¼ watt	13601
R-9, R-12, R-42	Resistor—33,000 ohms, ± 10%, ¼ watt	12454
R-10, R-11	Resistor—10,000 ohms, ± 10%, 1 watt	13097
R-13, R-14, R-39	Resistor—680,000 ohms, ± 10%, ¼ watt	12413
R-15	Resistor—10,000 ohms, ± 10%, ½ watt	3078
R-16	Potentiometer—5,000 ohms, r-f control	35409
R-17	Potentiometer—500 ohms, fine control	35410
R-18	Resistor—325 ohms, ± 2%, ¼ watt	35411
R-19	Resistor—75 ohms, ± 2%, ¼ watt	35412
R-20	Resistor—82 ohms, ± 2%, ¼ watt	35413
R-21, R-22, R-23	Resistor—91 ohms, ± 2%, ¼ watt	35414
R-24, R-25, R-26, R-27	Resistor—738 ohms, ± 2%, ¼ watt	35415
R-28	Resistor—68 ohms, ± 5%, ¼ watt	34763
R-29	Resistor—10 ohms, ± 10%, ¼ watt	34761
R-30, R-31	Resistor—56 ohms, ± 5%, ¼ watt	34762
R-32, R-42A	Resistor—27,000 ohms, ± 10%, ¼ watt	12738
R-34	Potentiometer, 200 ohms, meter zero control	35416
R-35, R-41	Resistor—68,000 ohms, ± 10%, ¼ watt	13715
R-36	Resistor—22,000 ohms, ± 10%, ¼ watt	13998
R-37	Resistor—220,000 ohms, ± 10%, ¼ watt	14583
R-38	Resistor—47,000 ohms, ±10%, ½ watt	30787
R-40	Resistor—1 megohm, ± 10%, ¼ watt	13730
R-42	Resistor—33,000 ohms, ± 10%, ¼ watt	12454
R-43	Resistor—91 ohms, ± 5%, ¼ watt	13245
R-44	Resistor—4,000 ohms, ± 10%	35417
C-1	Capacitor—Variable, less gears	35395
C-2	Capacitor—Toothpick, 12 mmfd., ± 10%, moulded	13002
C-3	Capacitor—Tubular, 0.35 mfd., ± 10% 400 volts	5196
C-4, C-5, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13	Capacitor—Trimmer, 1-7.3 mfd.	12807
C-14	Capacitor—Toothpick, 4.7 mmfd., moulded	14392
C-16, C-25, C-36	Capacitor—Tubular, .5 mfd., 200 volts	31701
C-17	Capacitor—Tubular, 1.0 mfd., 300 volts	32015
C-18, C-20, C-21	Capacitor—Toothpick, 3,900 mmfd., unmoulded	32197
C-19	Capacitor—Electrolytic, 10 mfd.,	33879
C-22, C-26, C-28, C-37	Capacitor—Tubular, .05 mfd., 400 volts	4886
C-23	Capacitor—Toothpick, 3,900 mmfd., moulded	13763
C-24, C-27	Capacitor—Toothpick, 820 mmfd., unmoulded	35418
C-29	Capacitor—Toothpick, 15 mmfd., moulded	12896
C-30, C-32	Capacitor—Toothpick, 270 mmfd., moulded	12488
C-31, C-33, C-34, C-35	Capacitor—Tubular, .25 mfd., 300 volts	12484
C-38, C-38A	Capacitor—Tubular .1 mfd., 400 volts	4839
C-39, C-40	Capacitor—Tubular, .01 mfd., 1,000 volts	14393
C-41, C-42	Capacitor—Electrolytic, 4-4 mfd.	14120
C-43	Capacitor—Output cable grid	14393
T-2	Power Transformer—105-125 volts, 50-60 cycles	9556
	Fuse Mounting	13210
F-1	Fuse—1 ampere	14133
	Tube Socket—For RCA-6J5	18007
	Tube Socket—For RCA-6SA7 and 6H6	18008
	Tube Socket	18467
	Tube Socket (Med. Pin, 7-prong)	33144
S-1	Switch (Band)	35419
S-2	Switch (Power Selector)	35420
S-3	Switch (Attenuator)	35421
L-14	Reactor	35930
	Knob—Bar knob	32116
M-1	Microammeter	35396
J-5	Connector — Normal output panel	18617
	Connector—Cable	18618
T-1	Oscillation Transformer	11775
J-1, J-3, J-4, J-6	Pin Jack (Red)	33890
J-2, J-7	Pin Jack (Black)	33891
J-8	Jack "Phones"	4924
L-1	Coil Assembly	35422
L-2	Coil Assembly	35423
L-3	Coil Assembly	35424
L-4	Coil Assembly	35425
L-5	Coil Assembly	35426
L-6	Coil Assembly	35427
L-7	Coil Assembly	35428
L-8	Coil Assembly (M-428271-508)	35429
L-9	Coil Assembly	35430
L-13	Peaking Coil	30917
	Cable—Output, complete	35431
	Jack (Black)—Cable	35432
	Jack (Red)—Cable	35433
	Cable—5 feet long, output, bare	
	Output Adapter—R-F	35434
	Cap—Rubber cap for cable	35435
	Handle—Case	30925
	Elastic Tip—Foot	30926
	Front Panel	35436
	Pointer	35437
	Knob (coarse adjustment) (black)	35438
	Knob (fine adjustment) (red)	35439
	Jack—Cable, ground	35695
	Clip—Output and cable, GND	35262
	Adapter—I-F	35696

THE RCA RIDER VOLTOHMYST

STOCK Nº 163

SCHEMATIC NOS.	DESCRIPTION	STOCK NOS.
R1, R10	Resistor, 150 Meg. ± 1%	35356
R11, R12) R13, R14)	Resistor, 5 Meg. ± 1%	35357
R15, R16	Resistor, 3 Meg. ± 1%	35358
R17, R18	Resistor, 1.5 Meg. ± 1%	35359
R19, R20	Resistor, 300,000 Ohms. ± 1%	35360
R21, R22, R23) R24, R33, R34)	Resistor, 100,000 Ohms, ± 1%	35361
R25, R26	Resistor, 10 Ohms, ± 1%	35362
R27, R28	Resistor, 100 Ohms, ± 1%	35363
R29, R30	Resistor, 1000 Ohms, ± 1%	35364
R31, R32	Resistor, 10,000 Ohms, ± 1%	35365
R35, R36	Resistor, 1 Meg. ± 1%	35366
R37, R38	Resistor, 10 Meg. ± 1%	35367
R39	Resistor, 2.5 Meg.	35368
R40	Resistor, 56,000 Ohms	35369
R41, R42	Resistor, 3,300 Ohms, ± 5% BW 1	35399
R43, R45	Resistor, 20,000 Ohms	35370
R44	Var. Resistor, 3,000 Ohms (Zero Control)	35400
R46	Resistor, 2,000 Ohms	35371
R47	Var. Resistor, 7,000 Ohms, (Calibration Control)	35401
R49	Var. Resistor, 8,000 Ohms (Ohms Control)	35402
R50	Resistor, 750 Ohms	35372
R51	Resistor, 10,000 Ohms	35373
R52	Resistor, 15,000 Ohms	35374
R53	Resistor, 4,000 Ohms	35375
C1, C2	Capacitor, 1 - 1 MFD, 400 Volts	35376
C3	Capacitor, .005 MFD, 1000 Volts	35377
S1	Range Switch	35378
S2	Volt - Ohm Switch	35379
S3	Polarity Switch	35380
T1	Power Transformer, 105-130 Volts 25 - 60 cycle	35381
	Lead - Red Test Lead Complete With Banana Plug and Probe Sleeve 48" Long	35530
	Lead - Black Test Lead Complete With Banana Plug and Probe Sleeve 48" Long	35531
	Lead - Black Ground Lead With Alligator Clip and Plug	35532
	Lead - Voltmeter Cable Complete With Isolating Resistor	35533
	Clip - Clip Attachment Assembly	35267

FUNCTION AND SPECIFICATIONS OF THE VOLTOHMYST

The Rider VoltOhmyst is designed to measure d-c voltages and d-c resistances over an extremely wide range. As a d-c voltage measuring device its range of operation is from 0.05 volt to 5000 volts. Its input resistance is constant at 16,000,000 ohms on all ranges up to 500 volts and constant at 160 million ohms on all ranges between 500 and 5000 volts.

The instrument will measure d-c voltages which are positive or negative with respect to ground, without switching leads and can be used for the measurement of d-c operating and control voltages up to 500 volts in signal-carrying circuits with the signals present. The instrument will not interfere with the operation of any circuit or element across which it may be connected. It is not necessary to reset the zero when changing voltage ranges. The accuracy of the voltmeter is within 2% of full scale.

The ohmmeter operates over a very wide range from 0.1 ohm to 1000 megohms without requiring resetting of the zero when changing ranges. The ohmmeter test voltage varies from 0.03 volt across 0.1 ohm to a maximum of 3 volts across 1000 megohms. The accuracy of the ohmmeter is within 3% at center scale.

CIRCUIT DESIGN

The VoltOhmyst uses a push-pull electronic vacuum-tube voltmeter of new design, the circuit of which is shown in Fig. 1. Unlike the conventional balanced voltmeter, the two tubes V1 and V2 are linked by means of a common high resistance R40. Because of this coupling, any change in the input voltage to the grid of V1 changes the cathode bias of V2 and as a result the change in the plate current of V1 is accompanied by a simultaneous change in the plate current of V2 in the opposite direction. The differential voltage thus developed across the load resistors R45 and R43 is applied to the meter, which is calibrated in terms of the voltage applied to the input and in terms of the resistance being measured when the instrument is used as an ohmmeter.

In addition to the push-pull action, a high degree of self-regulation is obtained as a direct result of the high value of coupling resistance R40. This is analogous to the regulating effect secured through the use of self-bias but because R40 is approximately 100 times as large as the value of cathode resistance which it is possible to use in conventional circuits, the self-regulating action is correspondingly increased. At the same time the excessive loss of sensitivity normally experienced when using such a high cathode resistance is eliminated in the VoltOhmyst because of the balanced nature of the circuit. A controlled amount of inverse feedback to obtain independence of tube characteristics is secured by means of the two resistors R41 and R42.

A principal factor limiting the maximum input resistance of d-c vacuum-tube voltmeters has been the problem of reducing the grid current and the so-called "contact potential" error to a low value. In the Rider VoltOhmyst, this problem has been solved successfully by the choice of a suitable tube type, the use of a very high cathode resistance, and by operation at a low plate voltage.

The ohmmeter circuit utilizes the vacuum-tube voltmeter described above to measure the ratio between the voltage across the unknown resistance and one of seven standard resistors. The latter range in value from 10 ohms to 10 megohms so that multiplying factors from R x 1 to R x 1,000,000 are provided.

As is to be expected from a consideration of the circuit description, the VoltOhmyst is exceedingly stable in operation, requires no readjustment of the zero when changing ranges, and is essentially independent of changes in the voltage and tube characteristics.

EQUIPMENT FURNISHED

The Rider VoltOhmyst has a self-contained power supply and also contains the ohmmeter test voltage. It is also provided with three (3) test leads and one (1) ground lead. The description and utility of these leads are given below.

Signal Circuit Probe

This probe is identified by the telephone plug at one end and it is used for all voltage measurements up to 500 volts d-c. This probe has a 1-megohm isolating resistor built into the bakelite sleeve, thereby preventing the capacitance of the shielded cable and VoltOhmyst input circuit from reacting upon the circuit under test. Because of this construction dynamic d-c voltage measurements can be made in circuits in which a-f, i-f or r-f signals are present.

High Voltage Probes

Two color-coded high voltage cables terminating in needlepoint probes are provided. These probes are interchangeable and are conservatively rated for operation up to 5000 volts and will safely withstand a test voltage of 11,000 volts in accordance with AIEE standards. A finger guard is provided on each probe sleeve.

Resistance Measuring Probes

The two probes identified as high voltage probes are intended for use when making resistance measurements.

Ground Lead

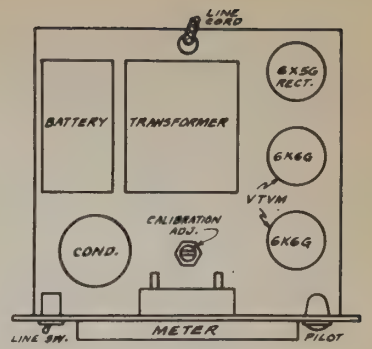
The ground lead, fitted with an alligator clip, serves as a ground or return connection between the VoltOhmyst and the device under test. It can be used for resistance measurements when it is more convenient to use a clip rather than a probe for one of the terminals.

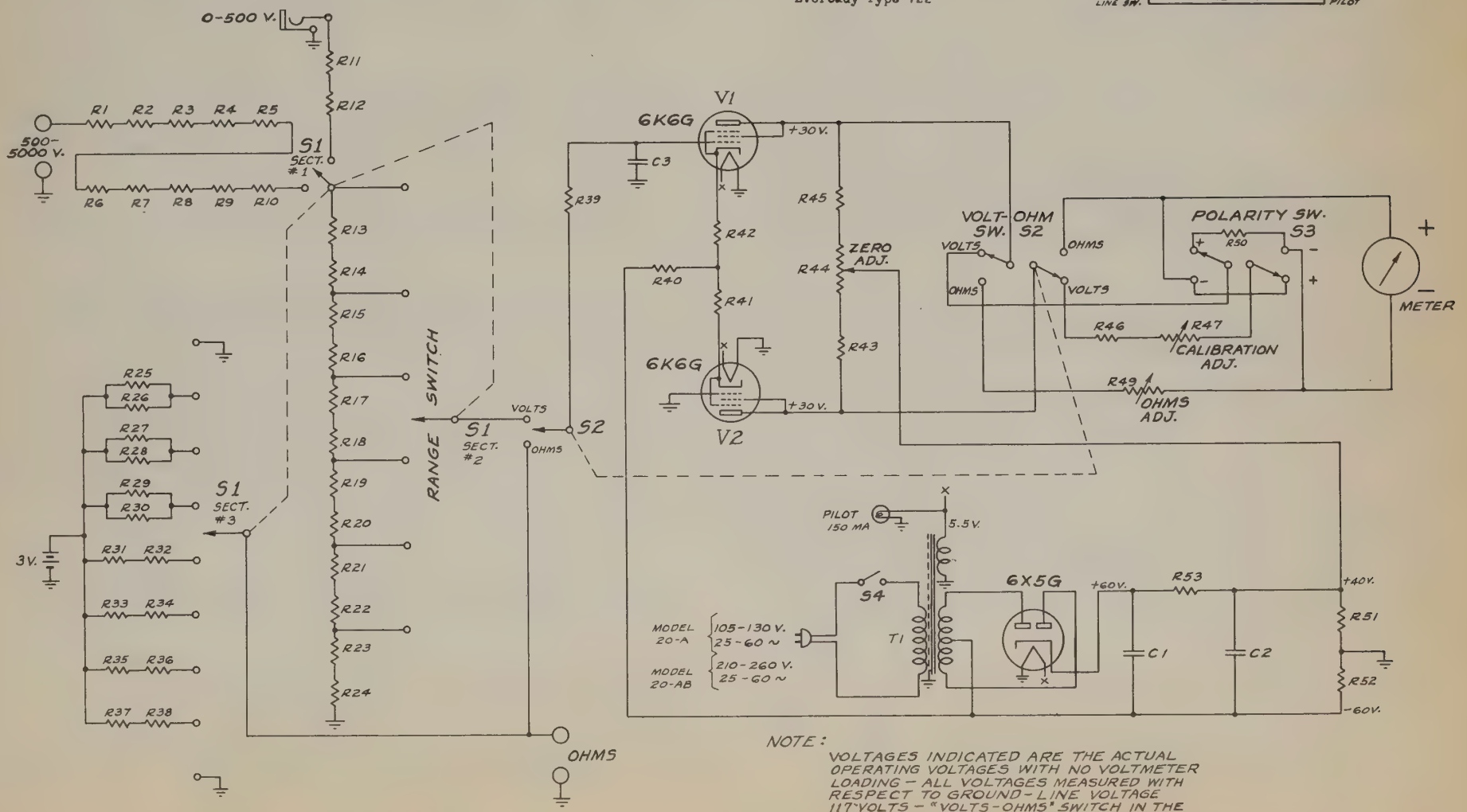
OPERATING NOTES

Initial Balancing Adjustments

1. Adjust the mechanical zero of the meter. Make sure that the pointer lines up with the zero setting on the volts scale. Look directly at the meter and not from an angle.

R1-R10	150 megohms±1%	R37,R38	10 megohms±1%	R52	15,000 ohms
R11,R12	5 megohms±1%	R39	2.5 megohms	R53	4,000 ohms
R13,R14	5 megohms±1%	R40	56,000 ohms	C1,C2	1-1 mf 400 volts, paper
R15,R16	3 megohms±1%	R41	3,800 ohms±5%		
R17,R18	1.5 megohms±1%	R42	3,800 ohms±5%	C3	.005 mf 1000 volts, mica
R19,R20	300,000 ohms±1%	R43	20,000 ohms		
R21,R22	100,000 ohms±1%		(matched with R45)	S1	Range switch
R23,R24	100,000 ohms±1%	R44	2,000 ohms	S2	Volt-Ohm switch
R25,R26	10 ohms±1%	R45	20,000 ohms	S3	Polarity switch
R27,R28	100 ohms±1%		(matched with R43)	S4	Line switch
R29,R30	1,000 ohms±1%	R46	2,000 ohms	T1	Power transformer
R31,R32	10,000 ohms±1%	R47	4,000 ohms		
R33,R34	100,000 ohms±1%	R49	5,000 ohms		
R35,R36	1 megohm ±1%	R50	750 ohms	Battery	Burgess Type F2BP or Eveready Type 722
		R51	10,000 ohms		





NOTE:
VOLTAGES INDICATED ARE THE ACTUAL OPERATING VOLTAGES WITH NO VOLTMETER LOADING - ALL VOLTAGES MEASURED WITH RESPECT TO GROUND - LINE VOLTAGE 117 VOLTS - "VOLTS-OHMS" SWITCH IN THE "VOLTS" POSITION

2. Plug instrument into alternating current supply. Set "Line Switch" to "on" position and allow several minutes for the instrument to warm up.

3. Turn "Volt-Ohm" switch to the "Volts" position. Then adjust the "Zero Adj." control until the meter pointer reads "0". When this adjustment is correctly made there will be no movement of the pointer when the "Polarity Switch" is changed from + to − or vice versa.

4. Set "Volt-Ohm" switch to "Ohms" position. The pointer will deflect to approximately full scale. Then set the "Ohms-Adj." control so that the pointer reads exactly full scale on the "Ohms" scale. This full scale adjustment is the very last line on the "Ohms" scale.

5. The instrument is now ready for use to measure either resistance or voltage.

To Measure D-C Voltages from 0-500 Volts

1. Set the "Volt-Ohm" switch to the "Volts" position.

2. Plug the signal circuit Voltmeter cable into the 0-500 volt jack in the center of the panel. Keep the fingers away from the tip end of the probe to eliminate stray pickup.

3. Connect the ground lead to one of the ground terminals of the VoltOhmyst.

4. Clip the VoltOhmyst ground lead (alligator clip) to the ground terminal of the apparatus on which voltage measurements are to be made; or to the ground side of the voltage which is to be measured.

5. Place the Voltmeter probe tip in contact with the point at which the d-c voltage is to be measured. If the pointer deflects to the left of the zero, change the setting of the "Polarity Switch".

6. Rotate the "Range" switch to a lower range if necessary, in order to obtain a stable reading upon the Voltmeter scale.

Special Note: The 0-500 volt jack is disconnected from the circuit when the "Range" switch is set on the 1000 volt, 2500 volt or 5000 volt positions.

To Measure Voltages From 500 to 5000 Volts

NOTE: HIGH VOLTAGES ARE DANGEROUS!....Use the utmost care to avoid accidental contact with or even close proximity to high voltage points. Keep the fingers and all other parts of the body as far away as conveniently possible from any high potential point. If at all possible when making high voltage measurements, attach the ground clip to the circuit to be measured with the power turned off in that circuit. For your personal safety these precautions and those listed below should be observed:

a. Keep the fingers well away from the probe tip.
b. Use only one hand.
c. Discard or repair leads if they should become accidentally cut or burned or in any way damaged.
d. Do not leave the probe tip connected to a high voltage point after measurement has been made. Remove it as soon as the voltage measurement is completed.

1. Turn the "Volt-Ohm" switch to the "Volts" position.

2. Turn the "Range" switch to the 5000 volt position.

3. Insert the high voltage probe (either one) into the 500-5000 terminal of the VoltOhmyst.

4. Connect the ground lead of the VoltOhmyst to the chassis or ground of the device on which voltage measurements are to be made.

5. Place the probe point in contact with the point at which the voltage is to be measured.

6. If the pointer deflects to the left of the zero, turn the "Polarity Switch" and do not reverse leads.

7. If required, set the "Range" switch to the 2500-1000 volt ranges to bring the reading higher up on the scale.

Note: The 500-5000 volt terminal is disconnected from the circuit when the "Range" switch is on any of the six low voltage ranges up to 500 volts, so that no reading will be obtained.

Do Not Connect Ground Lead To High Voltage Point

Since the VoltOhmyst case is connected directly to the ground terminal, the ground terminal of the instrument must not be connected to a high voltage point. Failure to observe this precaution may result in shock. It is good practice to keep the instrument at ground potential to avoid incorrect readings due to potential differences between the case of the instrument and the chassis of the apparatus under test.

To Measure the Voltage Between the Two Points Not at Ground Potential

1. Connect the VoltOhmyst ground lead to the chassis or ground of the apparatus to be measured.

2. Measure the voltage at one of the points. Let us say this voltage is 100 volts with respect to ground.

3. Now measure the voltage at the other point. Let us say that this voltage is 200 volts, with respect to ground.

4. The voltage drop between the two points is then equal to the difference between the two voltages with respect to ground. In the example cited the voltage drop between the two points is 200 - 100 or 100 volts.

To Measure D-C Resistance

1. Turn the "VoltOhm" switch to the "Ohms" position, and check the "Ohms Adj." for full scale deflection.

2. Connect the ground lead of the VoltOhmyst to the "Ohms" ground terminal and connect the alligator clip to one side of the resistance being measured. If desired, one of the high voltage probe leads can be used in place of the ground lead.

3. Connect one of the high voltage probe leads to the remaining "Ohms" terminal on the VoltOhmyst and place this probe tip in contact with the other side of the resistance being measured.

4. Rotate the "Range" switch so as to bring the pointer to approximately mid scale or as close thereto as possible, and read the value of resistance on the "Ohms" scale and add the number of zeros indicated by the setting on the "Range" switch to establish the value of resistance being checked.

   Example: Suppose that the reading on the Ohmmeter scale is "20" and the "Range" switch is set at R x 10,000. The value of resistance being checked is equal to 20 x 10,000 or 200,000 ohms.

   Another example is as follows: Suppose that the reading on the Ohmmeter scale is 8 and the "Range" switch is set to R x 1 megohm. The value of resistance being measured is 8 x 1,000,000 or 8,000,000 ohms.

   Still another example is as follows: Suppose that the reading on the Ohmmeter scale is 8 and the "Range" switch is set to R x 1. The resistance being checked is 8 x 1 or 8 ohms.

To Measure Other Low Resistances

The R x 1 range should be used only for resistances below 20 ohms. Above 20 ohms the high ranges should be used in order to decrease the value of current flowing through the resistance being checked. The elimination of lead resistance error is discussed below.

To Eliminate Lead Resistance Error

To cancel out the lead resistance error when working on the R x 1 range short the test leads and reset the "Zero Adj." control, so that the pointer reads exactly "0". This new setting will be slightly different from the original setting because of the resistance of the test leads. Then make the regular resistance check. When the measurement has been completed the "Zero Adj." control should be reset in accordance with the regular procedure as for voltage measurements.

To Minimize Stray Pickup

When measuring high resistances the fingers should be kept away from the probe point of the "Ohms" terminal to eliminate possible error due to leakage and stray pickup. This is especially important on the R x 100,000 and R x 1,000,000 ranges.

SPECIAL APPLICATIONS

The special applications of the VoltOhmyst noted below are in addition to its general use for all ordinary d-c voltage and resistance measurements.

To Measure D-C Control and Operating Voltages

The high resistance input of the VoltOhmyst enables its use in signal-carrying circuits to measure d-c control voltages, irrespective of the source of these voltages; automatic volume control (AVC), automatic frequency control (AFC), automatic volume expansion (AVE), automatic bass control (ABC), etc. voltages can be measured exactly as if they were normal d-c operating potentials by connecting the ground of the VoltOhmyst to the ground point of the receiver or device being checked or to whatever point may be the low potential side of the voltage circuit in the device. The VoltOhmyst is then set for voltage measurement and the signal circuit probe is used. Since these voltages are all less than 500 volts the "Range" switch is set to some value between 0 and 500 volts. Usually these voltages do not exceed 25 volts. The Voltmeter probe then is placed in contact with that point in the system where the control voltage is to be measured. This can be the control grid of the controlled tube, the diode, or whatever the element in the circuit arrangement. The presence of the signal does not interfere with the measurement of the voltage. Simple values of rectified voltage can be measured across the circuits where they appear.

The measurement of operating voltages is carried out in exactly the same manner by placing the signal circuit probe point in contact with that point in the receiver where the operating voltage is to be checked. The high resistance of the instrument does not load the circuit, therefore the indicated voltage is the actual operating voltage effective at that point in the circuit.

When checking the d-c voltage in circuits where a-c is present, the a-c component is attenuated by means of a filter network (contained within the VoltOhmyst, constituting a series resistor having a minimum value of 8.5 megohms and the usual condenser of .005 mf). Since the VoltOhmyst is essentially linear there will be no error as a result of rectification unless the peak a-c voltage after attenuation exceeds the full scale reading of the range to which the instrument is set. For all ordinary measurements the attenuation of the filter is sufficiently great so that an a-c component present will have no effect on the reading.

To Measure Oscillators

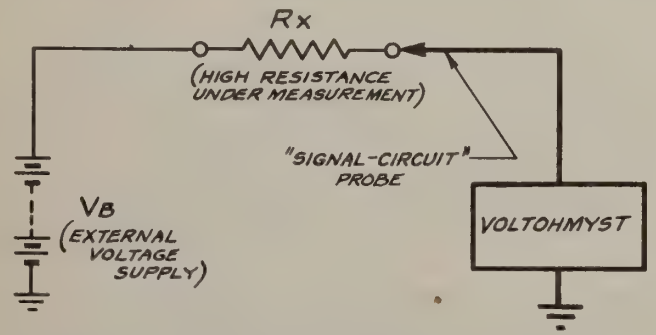
Oscillator operation from the lowest audio frequencies up to and including ultra-high frequencies can be checked rapidly with the VoltOhmyst by measuring the rectified voltage present at the control grid of the oscillator tube. To make this measurement the "signal circuit" probe is placed in contact with the control grid of the rectified voltage reading on the VoltOhmyst scale. The high input resistance of the VoltOhmyst and the design of the signal circuit probe reduce the reaction on the circuit being measured to an entirely negligible value.

The value of the rectified voltage across the oscillator grid leak is a direct measure of the oscillator output. This voltage is negative and will, in general, vary as the oscillator is tuned. The performance of the oscillator at any frequency is readily indicated by the value of the voltage at the grid. Dead spots at certain frequencies will be indicated by zero voltage or by voltage dependent upon the grid return in the oscillator system.

Measurement of High Resistance and Condenser Leakage:

The voltmeter section of the VoltOhmyst can be used to measure resistances higher than that covered on the R x 1,000,000 range in accordance with the procedure noted below. This application is especially useful for the measurement of the leakage resistance of paper and mica condensers which is usually above 1000 megohms.

An external voltage supply is required as shown in the accompanying figure. This voltage may range in value from approximately 20 to 500 volts. The



CIRCUIT FOR MEASURING RESISTANCES ABOVE 1000 MEGOHMS

unknown resistance is connected between the high side of the voltage supply and the "signal-circuit" probe. If the leakage resistance of a condenser is being measured, the condenser is connected in exactly the same manner as the resistance shown in the figure.

If R_x = Unknown resistance, or the condenser insulation resistance,

V_B = External voltage supply

and

V = Reading of the VoltOhmyst

then

$$R_x = 16 \frac{V_B - V}{V} \text{ megohms}$$

$$= 16 \frac{V_B}{V} \text{ megohms when V is small in comparison with } V_B$$

A typical example is shown below:

V_B = 250 volts

V = 0.1 volt

$$R_x = 16 \times \frac{500}{0.1} = 80{,}000 \text{ megohms}$$

Then measuring the insulation resistance of condensers, the VoltOhmyst should always be set on the 500 volt range until the condenser is charged. The "Range" switch may then be set to a lower range in order to measure accurately the leakage voltage developed across the input resistance of the VoltOhmyst.

MAINTENANCE

Voltage Data

Normal operating voltages are indicated on the schematic diagram. These are the actual operating voltages as measured by a high-resistance voltmeter, with all test leads removed and the line voltage at 117 volts.

Calibration Adjustment

The VoltOhmyst is provided with a calibration adjustment, R47, which is originally set at the factory to compensate for small variations in meter sensitivity and tube characteristics. This adjustment ordinarily does not require to be changed, except when tubes are replaced.

Should readjustment of the calibration control become necessary, follow the procedure outlined below. A known voltage of 5 volts is required for this operation. This voltage is preferably obtained from a potentiometer, but if a potentiometer is not available an accurate meter can be used to check the voltage.

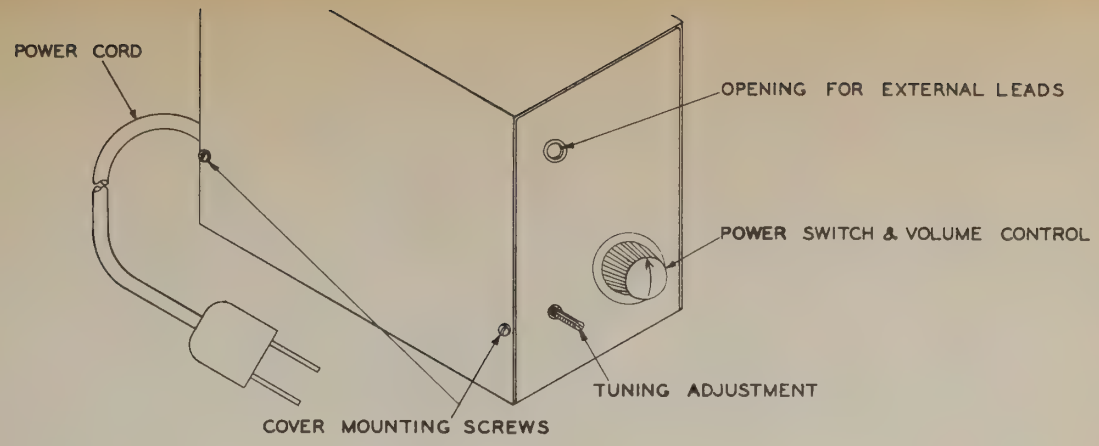
1. Check the mechanical zero of the meter.
2. Turn the power switch on, allow the instrument to heat for several minutes and set the "Zero Adj." control.
3. Connect the VoltOhmyst across the known voltage.
4. Adjust the calibration adjustment control so that the meter reads exactly 5 volts with the "Range" switch in the 5-volt position.
5. This completes the adjustment. The two 6K6G tubes should not be interchanged since this may have a slight effect on the accuracy of calibration.

Tubes

The VoltOhmyst uses 2-6K6G and 1-6X5G tubes. Because of the low operating voltages the tube life will be unusually long. However, when replacement becomes necessary care should be taken to see that the tubes are approximately balanced. If the tubes are unbalanced, it will be impossible to bring the pointer to zero by means of the "Zero Adj." control. If this should happen, the tubes should be interchanged and the "Zero Adj." tried. If it is still impossible to bring the pointer to zero, the tubes have different characteristics and each of the two tubes should be matched with a third tube in order to obtain a balanced pair. When the tubes are matched it will be possible to bring the pointer to zero with the "Zero Adj." control approximately in the middle of its range.

Grid Current

The circuit design of the VoltOhmyst is such that grid current is reduced to a negligible value. When replacing tubes it is advisable to check for grid current as occasionally a gassy tube will be found. The presence of gas is indicated by an appreciable change in the pointer position when the "Range" switch is changed from the 5-volt to the 25-volt position. (Volt-Ohm switch in the "Volts" position).



INSTRUCTIONS

for

RCA RADIO COUPLING UNIT, STOCK #41912

RCA MODULATED OSCILLATOR, STOCK #41907

POWER SUPPLY REQUIRED

105-125 Volts, AC or DC

36 Watts (At 115 Volts)

RADIOTRON

1 RCA-12A7

FREQUENCY RANGE

900-1200 Kilocycles (Approx.)

MECHANICAL SPECIFICATIONS
(STOCK #41907 only)

Width	-	3 1/4 Inches
Depth	-	7 Inches
Height	-	3 3/4 Inches
Weight	-	1 3/4 Pounds

WARNING: Do not open the case, or make any changes in connections unless the power has been disconnected.

DESCRIPTION AND APPLICATION

The RCA Stock #41912 Radio Coupling Unit consists of two items, (a) an RCA Stock #41907 Modulated Oscillator, and (b) an RCA Stock #41905 Microphone. As its name implies, the primary purpose of the Radio Coupling Unit is to couple electrical devices such as microphones, record players, etc. to the ordinary radio receiver, thereby using the amplifier and loudspeaker of the receiver for reproducing to a suitable volume the impulses from these devices. The method of operation does not require a metallic connection from the oscillator to the radio. It is merely necessary to wrap an insulated wire, which has been connected at one end to the oscillator, a few times around any section of the lead-in of the antenna of the radio receiver.

It should be noted that the radio receiver antenna is not necessary for the functioning of the Radio Coupling Unit with the radio receiver. In cases where the radio receiver antenna does not exist (external to the set), or is not connected to the radio receiver, or when a balanced antenna system is used, the necessary coupling between the Modulated Oscillator and the radio receiver can be obtained by connecting a short wire to the antenna connection of the radio receiver and twisting this wire with the antenna wire from the Modulated Oscillator. If no antenna connection exists on the radio receiver, experiment to find the best place to locate the antenna of the Modulated Oscillator with respect to the radio receiver. In some cases better results are obtained if the short wire described above is used instead of the radio receiver antenna, thereby reducing static and other disturbances. In addition, interference by strong broadcast signals is greatly reduced..

The Stock #41907 Modulated Oscillator consists of an oscillator coil, an RCA-12A7 Radiotron, and the necessary components such as resistors, capacitors, etc., required for operation, mounted in a gray metal case. Two controls are provided; a volume control for adjusting the oscillator output (combined with the "ON-OFF" switch), and a screwdriver adjustment for tuning the oscillator to the radio receiver. The Power Cord is a special type which includes resistance to permit operation of the Radiotron RCA-12A7 filament from the 105-125 volt power line, and for this reason, the cord must not be shortened, or altered

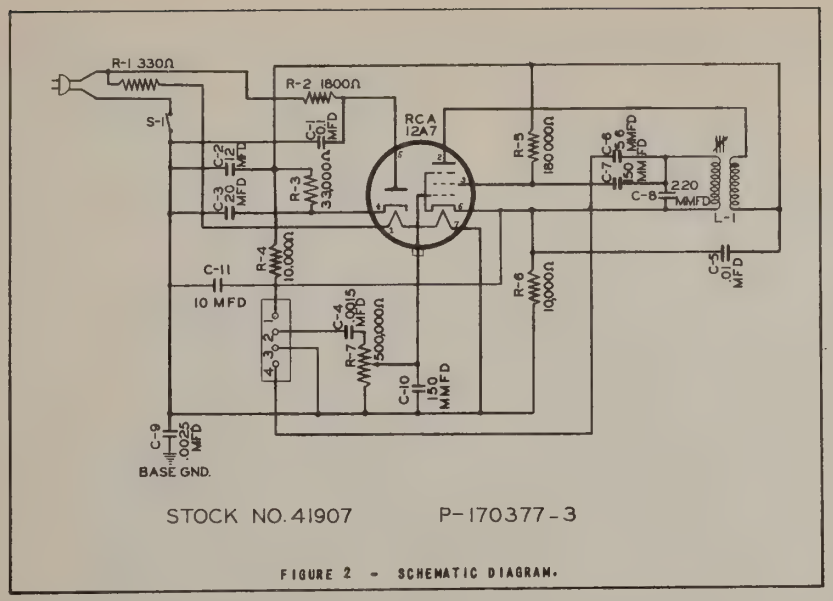


FIGURE 2 - SCHEMATIC DIAGRAM.

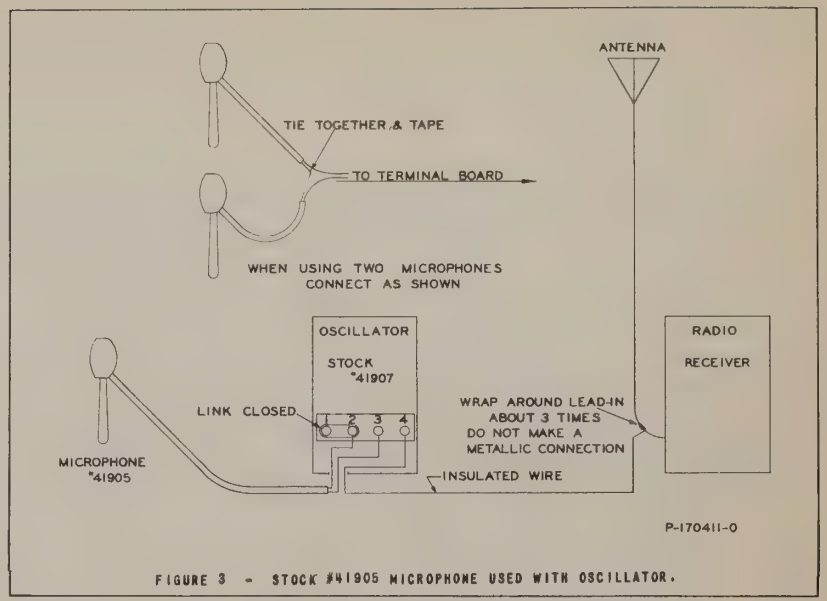


FIGURE 3 - STOCK #41905 MICROPHONE USED WITH OSCILLATOR.

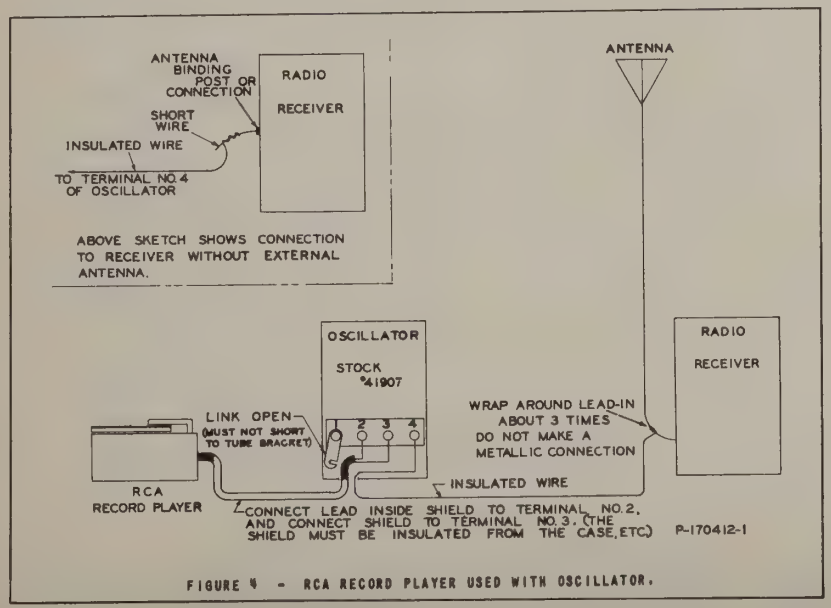

ANTENNA BINDING POST OR CONNECTION
RADIO RECEIVER
SHORT WIRE
INSULATED WIRE
TO TERMINAL NO. 4 OF OSCILLATOR
ABOVE SKETCH SHOWS CONNECTION TO RECEIVER WITHOUT EXTERNAL ANTENNA.
ANTENNA
OSCILLATOR STOCK #41907
RADIO RECEIVER
LINK OPEN (MUST NOT SHORT TO TUBE BRACKET)
WRAP AROUND LEAD-IN ABOUT 3 TIMES DO NOT MAKE A METALLIC CONNECTION
RCA RECORD PLAYER
INSULATED WIRE
CONNECT LEAD INSIDE SHIELD TO TERMINAL NO. 2. AND CONNECT SHIELD TO TERMINAL NO. 3. (THE SHIELD MUST BE INSULATED FROM THE CASE, ETC.)
P-170412-1

FIGURE 4 - RCA RECORD PLAYER USED WITH OSCILLATOR.

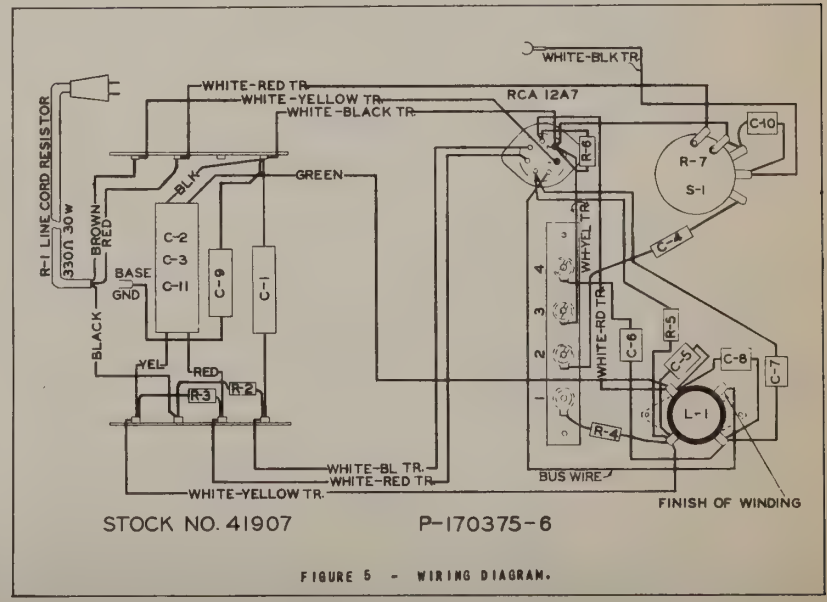


FIGURE 5 - WIRING DIAGRAM.

in any way. If necessary to have a longer cord, an extension cord complete with male and female plugs must be provided.

The Stock #41905 Microphone is of the type using carbon granules, and is provided with a cord for making external connections. The microphone is a delicate instrument and should be handled with care. No attempt should be made to dis-assemble it or make any repairs to it. Because of the small cost of a replacement unit, repairs at the Factory are not contemplated.

INSTALLATION

CAUTION: Be sure the power has been disconnected before opening the case or making any changes in connections.

The wire used for making connections from the oscillator to the radio, record player, etc., may be similar to radio receiver lead-in wire. Ordinary #18 or #20 gauge, single conductor, insulated wire may also be used for this purpose. The type of wire sold by the average radio, hardware, and ten cent store as "annunciator" (bell) wire is satisfactory.

(A) USING ONE OR MORE STOCK #41905 MICROPHONES

(1) Refer to Figure 3.

(2) Remove the oscillator cover.

(3) Close the link on the oscillator terminal board between terminals #1 and #2.

(4) Connect the microphone, or microphones, (see Figure 3) to terminals #2 and #3 of the terminal board.

(5) Connect a wire to terminal #4. Run this wire to the radio receiver and install as described above.

(6) Connect the power plug to an outlet of 105-125 volts.

(B) USING AN RCA RECORD PLAYER.

(1) Refer to Figure 4.

(2) Remove the oscillator cover.

(3) Open the link on the oscillator terminal board between terminals #1 and #2.

(4) Connect the record player to terminals #2 and #3 of the terminal board, in the following manner: Connect the metal braid (shielding) of the wire from the pick-up unit of the record player to terminal #3 of the Modulated Oscillator Terminal strip, being careful not to short the metal braid (shielding) to the case of the Oscillator, or to any other point except terminal #3. The lead inside the shield, of course, always connects to terminal #2.

(5) Connect a wire to terminal #4 of the Oscillator. Run this wire to the radio receiver and install as described above.

(6) Connect the power plug to an outlet of 105-125 volts.

OPERATION

(A) USING ONE OR MORE STOCK #41905 MICROPHONES.

(1) Turn on the power to the radio and to the oscillator. The power switch of the oscillator is at the counter-clockwise end of the volume control. Allow about thirty (30) seconds for the Radiotrons to heat.

NOTE: When using a DC source of power, the power plug should be reversed if operation is not readily obtained. This is necessary because proper polarity is essential when using DC power. When using an AC source of power, this precaution is unnecessary.

(2) Adjust the radio volume control to the position normally used when receiving radio broadcasts.

(3) Tune the radio to some point on the dial between 900 and 1200 where no radio broadcast or other signal is heard.

NOTE: For radio receivers with automatic or "push-button" tuning, a convenient arrangement is to set one push-button for the frequency of the Modulated Oscillator, the procedure being the same as for a regular broadcast station. The selected push-button then becomes the "Radio Coupling" button and can be selected in the same manner as regular broadcasting stations.

(4) Adjust the oscillator volume control to approximately two-thirds of the maximum value.

(5) Talk directly into the microphone (a descniption of microphone technique is given in a later paragraph), and at the same time tune the oscillator coil until the voice is heard clearly from the radio loudspeaker.

(6) If necessary, readjust the oscillator and radio volume controls to obtain the desired volume.

(B) USING AN RCA RECORD PLAYER.

(1) Same as (1) in (A) above, except also plug in the power to the record player.

(2) Same as (2) in (A) above.

(3) Same as (3) in (A) above.

(4) Same as (4) in (A) above.

(5) Lower the needle to the record, and tune the oscillator coil until the sound is heard clearly from the radio loudspeaker.

(6) If necessary, readjust the oscillator and radio volume controls to obtain the desired volume.

MICROPHONE TECHNIQUE

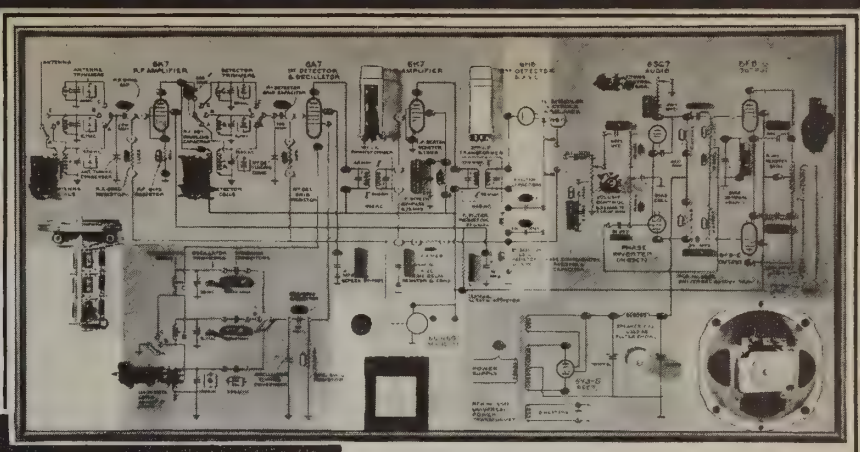
The results obtained with the Radio Coupling Unit depend to a great extent on proper use of the microphone. The Stock #41905 Microphone is a "close-talking" unit, and should be held almost touching the lips.

Care should be taken to avoid "feed-back". Feed-back is an objectionable squealing or whistling noise caused by sound from the loudspeaker reaching the microphone. The remedy is to place the microphone a greater distance from the loudspeaker, or to turn it at an angle so that the sound does not reach the microphone directly. Sometimes, it may be advisable to locate the microphone in a separate room from the loudspeaker.

Feed-back may also be caused by excessive volume, and the remedy in this case is to reduce the volume.

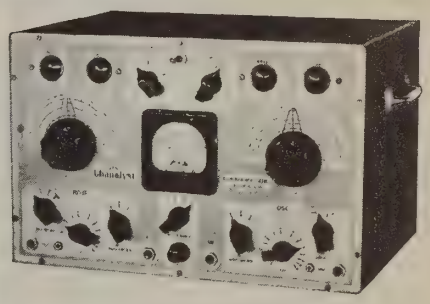
SYMBOL	DESCRIPTION	STOCK NUMBER
C-1	Capacitor, 0.1 Mfd.	4839
C-2/C-3/C-11	" 20/12/10 Mfd.	35080
C-4	" 0.0015 Mfd.	33806
C-5	" 0.01 Mfd.	4937
C-6	" 56 Mmfd.	12723
C-7	" 150 Mmfd.	12725
C-8	" 220 Mmfd.	12694
C-9	" 0.0025 Mfd.	5107
C-10	" 150 Mmfd.	12725
L-1	Coil, Oscillator Coil	32501
R-1	Cord, Power Cord, 330 Ohms	33849
R-2	Resistor, 1,800 Ohms	12194
R-3	" 33,000 Ohms	12454
R-4	" 10,000 Ohms	14559
R-5	" 180,000 Ohms	13698
R-6	" 10,000 Ohms	14559
R-7	Potentiometer (Volume Control)	33845
---	Knob for Volume Control	15446
---	Socket, for RCA-12A7	33847

Buy on Proof!



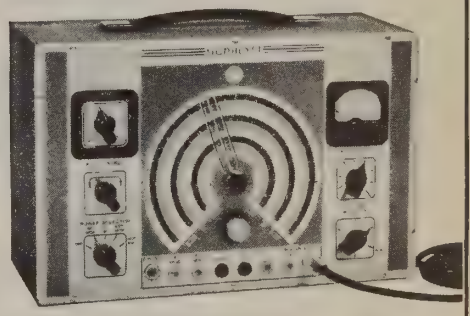
DYNAMIC DEMONSTRATOR

Shows How RCA Test Equipment Licks Service Problems Faster . . . More Profitably



The RCA Rider Chanalyst . . . The Original Signal Tracer that Revolutionized Servicing! Net Price . . . $107.50

The RCA Rider VoltOhymst . . . The only instrument of its kind, a Push-Pull Electronic Voltometer-Ohmmeter. 0.05-5,000 Volts DC in 9 Ranges. 0.1 Ohm-1,000 Megohms in 7 Ranges . . . Net Price $57.50



The RCA Signalyst . . . The Most Modern Signal Generator. Range—100 Kc—120 Mc in fundamentals. Net Price $107.50

Unique Instrument . . . made for distributors to sell to schools . . . enables your distributor also to demonstrate for you why it pays you to buy RCA Test Equipment!

THE RCA Dynamic Demonstrator will fascinate you. It's one of the most amazing ideas ever developed in radio. Besides fascinating you... it will do you a good turn if you've had any doubts about which test equipment can do the most for you in your business.

The RCA Dynamic Demonstrator is the "glass lady" or "transparent woman" of radio...a radio set turned inside out and designed so you can create any defect in a radio circuit. All the component parts of a typical modern AC receiver are shown visually. It is made so parts can be substituted for individual tests. So...it is easy to show the advantages of RCA Test Equipment by actually demonstrating dynamically how this equipment locates defects in any or all parts of a receiver.

Before you buy any new test equipment . . . go to your RCA Distributor. He'll give you dramatic proof of the superiority of RCA Test Equipment through the Dynamic Demonstrator. Buy on proof! Buy RCA.

Double Opportunity for RCA Distributors!

•

The RCA Dynamic Demonstrator offers you the greatest selling aid in history. You'll make more RCA Test Equipment sales because the Demonstrator makes it easy for you to prove the advantages of this equipment. And . . . every school where radio is taught is a potential customer for the Demonstrator itself.

RCA Test Equipment

RCA Manufacturing Co., Inc., Camden, N. J. • A Service of Radio Corporation of America

The RIDER CHANALYST *Is tops*

The RIDER CHANALYST $107.50 net
It will pay for itself by saving your time ...upping your profits

The Rider Chanalyst established signal tracing! It was the first instrument of its kind and still is the top instrument! Dollar for dollar the RCA Rider Chanalyst offers the most for the money.

The present day RCA Rider Chanalyst is the result of years of development based on a wide range of receiver circuit knowledge, test equipment application, and country-wide contacts with the servicing fraternity. Every possible arrangement of meters, "eyes," and other type indicators was tried. The final version of the RCA Rider Chanalyst offers the greatest amount of utility and flexibility combined with built-in stability and freedom from complicated circuits for the lowest possible price. For instance: Five separate channels are available *simultaneously,* permitting the isolation of intermittent troubles—the bane of your existence—in the shortest possible time. The RF-IF channel is a 3-stage tuned r-f amplifier—resonated vacuum tube voltmeter type—assuring adequate sensitivity and selectivity. A calibrated meter—automatically protected against normal overloads—is arranged to function in 4 channels at the option of the operator. The use of inertia-less "electronic eyes" as indicators affords the greatest speed of action for fast servicing since the "eye" provides an easily observed signal level permitting stage gains to be read directly from level control. No loss of speed or efficiency in the shop should an indicating device become inoperative as "eyes" can be locally replaced.

The RCA Rider Chanalyst permits circuit signal condition checks rather than the time-consuming cut and try part removal and checking. Complicated circuits become as easy to service as the simplest.

The RCA Rider Chanalyst is already being used by more than 3000 progressive members of the servicing fraternity in the relatively short time since its appearance. These men are finding the RCA Rider Chanalyst is making servicing more profitable. Before you buy—ask the man who uses one!

Over 335 million RCA Radio Tubes have been purchased by radio users . . . in tubes, as in parts and test equipment, it pays to go RCA All the Way.

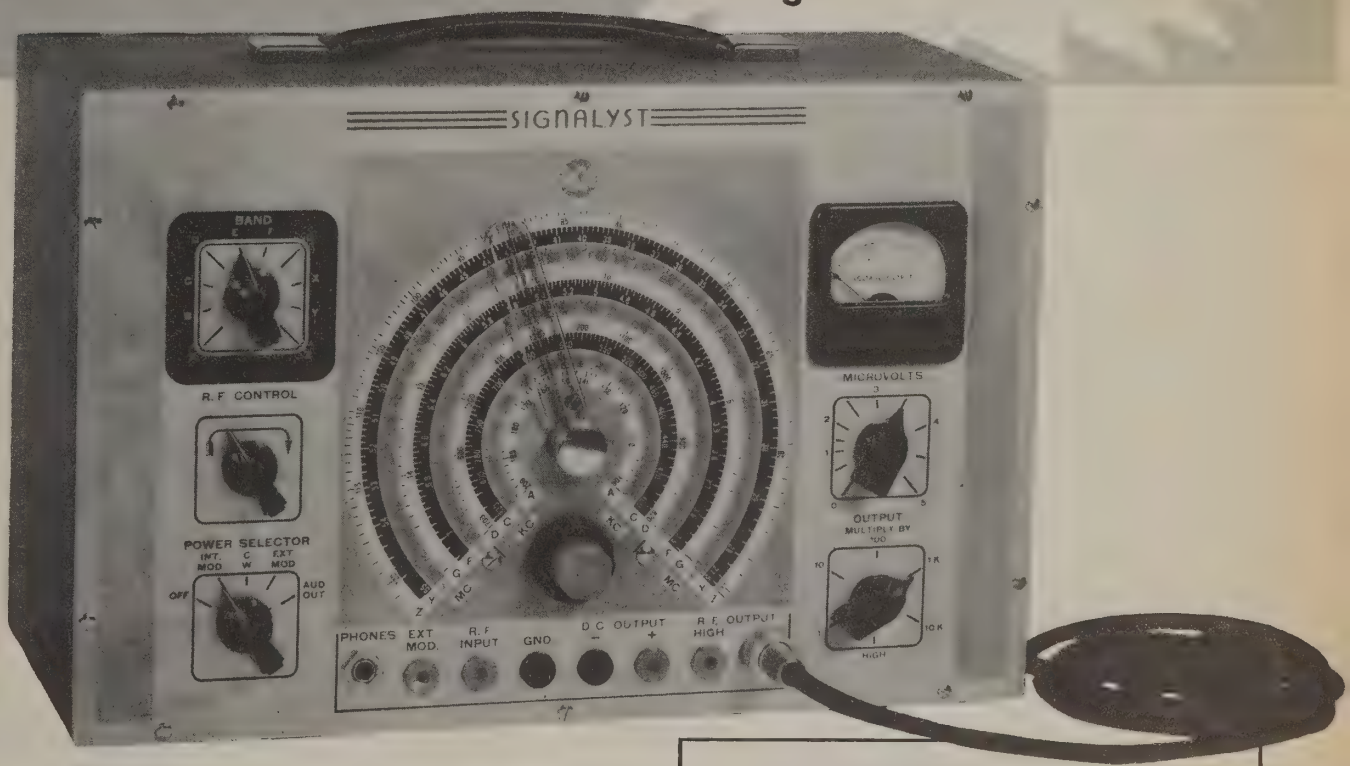
RCA *Test Equipment*

RCA Manufacturing Co., Inc., Camden, N. J. · A Service of the Radio Corporation of America

The RCA SIGNALYST

The Most Modern Signal Generator

Range—100 KC-120 MC



New service instrument is important companion to the Rider Chanalyst and Rider VoltOhmyst

Dollar for dollar, feature for feature, the new RCA Signalyst is the best buy in Signal Generators. Its amazing range is greater than any test oscillator...Its accuracy and stability are the tops ...Stray signal leakage is kept at a minimum...AC operated with regulated power supply...It is beautiful to look at and simple to operate—truly a magnificent instrument you will be proud to own.

Keyed to the famous RCA policy of design for minimized obsolescence, the RCA Signalyst is the Signal Generator for you! It is the instrument which takes care of today's needs in radio and tomorrow's needs in radio and television—the instrument designed with an eye to the future. Buy now...make your service work pay you more profits.

ONLY RCA OFFERS YOU ALL THESE FEATURES!

All frequencies in fundamentals • Magnetite core coils and air trimmer capacitors • Ladder-type attenuator with direct reading in microvolts with meter • Large dial (approx. 90 inches scale length)—Bands in three colors • Output available at end of coaxial cable • Internal 400 cycle modulation and 400 cycle output available • Metering circuit useful as zero beat indicator in calibration work • Self-contained heterodyne detector allows direct calibration of any external signal • D-C connection for standard *as well as television* crystal calibrator, gives direct calibration of instrument • Suitable for broad band modulation up to 5 MC such as required for television signal modulation • High signal level for single stage work • Regulated Plate and Screen voltage supply • Frequency range 100 KC—120 MC (10 bands), accuracy ±1% • Maximum Output Voltage: 1. Low Range .05V. 2. High Range .3V • Minimum Output Voltage: 100 KC to 15 MC, 1 microvolt; 15 MC to 30 MC, 5 microvolt; 50 MC to 60 MC, 25 microvolt; 60 MC to 120 MC, 50 microvolt.

$107.50 NET

Over 335 million RCA radio tubes have been purchased by radio users. In tubes, as in parts and test equipment, it pays to go RCA All the Way. More than 3000 Rider Chanalysts are making money for service men.

RCA *Test Equipment*

RCA Manufacturing Company, Inc., Camden, N. J.
A Service of the Radio Corporation of America

THE RIDER VOLTOHMYST

A NEW PUSH-PULL ELECTRONIC VOLT-METER—OHMMETER

.05—5,000 Volts D-C in 9 Ranges

0.1 ohm—1,000 Megohms in 7 Ranges

Net Price

$57.50

Stock No. 163

The Rider VoltOhmyst is a radically new Electronic d-c Voltmeter-Ohmmeter with extremely wide ranges. 10 billion to one is the ratio of its resistance range! This is wide enough to take care of the servicing and engineering requirements of today and tomorrow. It is designed for use on Television, radio receivers, transmitters, aircraft radio, power, sound, facsimile and other similar types of engineering work.

With it you can measure with speed and accuracy d-c voltage in high resistance photo-cell circuits, television circuits, bias cells, operating voltages across tuned circuits with the signal present. In every case it is the actual operating voltage that is measured, since there is no circuit loading. Its input resistance of 160,000,000 ohms on all ranges between 500 volts and 5,000 volts makes this a universal instrument, truly minimizing obsolescence.

The Rider VoltOhmyst measures 0.05 to 5,000 volts d-c—0.1 ohm to 1,000,000,000 ohms with a greater convenience than any other existing instrument. The VoltOhmyst has one scale—one zero adjustment. You just put the proper probe on the point to be measured and the scale shows the voltage or resistance without any adjustments.

The Rider VoltOhmyst is accurate—3% accuracy on the Ohmmeter, 2% on the Voltmeter. The input resistance of the Voltmeter is 16,000,000 ohms up to 500 volts and 160,000,000 ohms from 500 to 5,000 volts.

SPECIFICATIONS

VOLTMETER

RANGES...Nine ranges, 0-5, 10, 25, 100, 250, 500, 1,000, 2,500 and 5,000 volts.

INPUT RESISTANCE...16,000,000 ohms on 5, 10, 25, 100, 250 and 500 volt ranges. 160,000,000 ohms on 1,000, 2,500 and 5,000 volt ranges.

ACCURACY.....2% of full scale

OHMMETER

RANGES...Seven decade ranges measuring from 0.1 ohm to 1,000,000,000 ohms; 10 ohms center scale on lowest range, 10 megohms center scale on highest range; logarithmic spread over 80% of scale.

ACCURACY.....3% at center scale

OTHER FEATURES

METER...Rugged, high torque movement; heavy alnico magnet providing high flux density; silver-etched dial; 4" scale.

TERMINALS...Heavy brass, nickel-plated; accommodate banana plugs, phone tips and wire leads.

TEST LEADS...Two leads, 48" long; special "signal circuit" voltmeter cable equipped with isolating resistor built into bakelite probe sleeve; ground lead with alligator clip.

CABINET...Welded steel case, sloping front; crystalline gray finish.

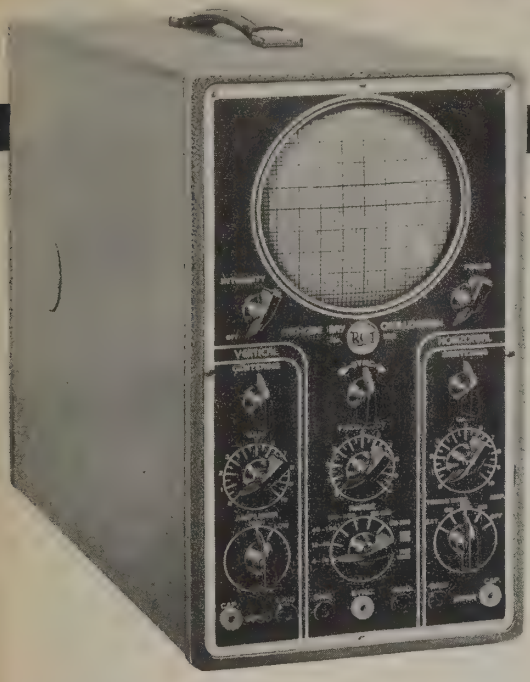
DIMENSIONS.....Base—7½" wide x 8¼" deep; height—11"

WEIGHT.....14 lbs.

TUBES.....2 RCA-6K6G and 1 RCA-6X5G, total 3

POWER SUPPLY...25-60 cycles, 105-130 volts; power consumption 12 watts.

5-INCH GENERAL PURPOSE OSCILLOGRAPH



This fine portable instrument embodies all of RCA's skill and experience in oscillograph manufacture. Not only will it perform all the functions of other RCA Oscillographs (except the Television model) but it may be used for engine pressure measurements and similar applications. The amplifiers have unusually wide ranges; the 5-inch screen gives an easily read image and all controls are conveniently located on the front panel. Its compact construction provides easy portability — weighs only 30 pounds. Attractively styled in typical RCA manner. Check the specifications of this fine new instrument and see what unusual value the RCA No. 160 Oscillograph offers.

Net Price

$130.00

Stock No. 160

TUBE COMPLEMENT

1 RCA 879; 1 RCA 80; 1 RCA 1802-P-1; 1 RCA 884; 3 RCA 6C6.

SPECIFICATIONS

DEFLECTION SENS. AT VERT. AMP. INPUT (gain max.)	.013 V RMS per inch
DEFLECTION SENS. HORIZ. AMP.	0.56 V RMS per inch
INPUT AT VERT. AMP. INPUT	500,000 ohms
INPUT HORIZ. AMP.	500,000 ohms, 15 mmf.
FREQ. CHARACTERISTIC VERT. AMP. (gain max.)	3 cycles—50 kc. essentially flat
FREQ. CHARACTERISTIC HORIZ. AMP.	5 cycles—100 kc. essentially flat
MAX. SIGNAL INPUT TO VERT. AMP.	500 volts RMS
MAX. SIGNAL INPUT TO HORIZ. AMP.	500 volts RMS
HORIZONTAL SWEEP VOLTAGE	4 cycles to 22,000 cycles
POWER	105-125 volts; 50-60 cycles; 55 watts
FINISH	Blue-gray baked wrinkle finish
SIZE	14¼" H.; 8" W.; 19¼" D.

Net Price

$63.95

Stock No. 155

Stock No. 9640. Same as 9545 (earlier model) but for 25 cycle operation.

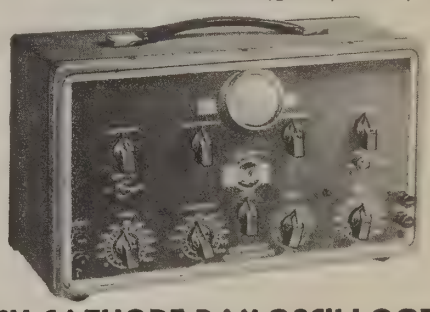
NET **$68.95**

3-INCH CATHODE RAY OSCILLOGRAPH

The RCA 3-inch Cathode Ray Oscillograph is ideal for the vast majority of service applications. The image is quite large while the controls are simple and easy to operate. All controls, including the spot centering controls, are located on the front panel. Greater portability is achieved through reduced size and weight. Attractive styling, more flexible electrical design and better performance make this instrument unusually attractive. Uses improved high-sensitivity Cathode Ray Tube with Aquadag tube coating.

SPECIFICATIONS

RADIOTRONS	1 RCA-906 (improved type), 2 RCA-6C6, 2 RCA-80, 1 RCA-884—Total 6.
SENSITIVITY	Without amplifier—20 volts (RMS) per inch deflection. With amplifier—0.5 volt (RMS) per inch deflection.
AMPLIFIER: RESPONSE	Flat, 20-90,000 cycles—Gain 40
TIMING AXIS	15-22,000 cycles
CONTROLS	Front panel for all operations, including panel centering.
POWER SUPPLY	110 volts, 50-60 cycles
INPUT POWER	50 watts
DIMENSIONS	Height 15", width 8", depth 14", Weight 21 lbs.
FINISH	Blue-gray baked wrinkle lacquer with streamlined handle. Copper plating on chassis and inside of panel and cabinet.



2-INCH CATHODE RAY OSCILLOGRAPH

Net Price

$49.95

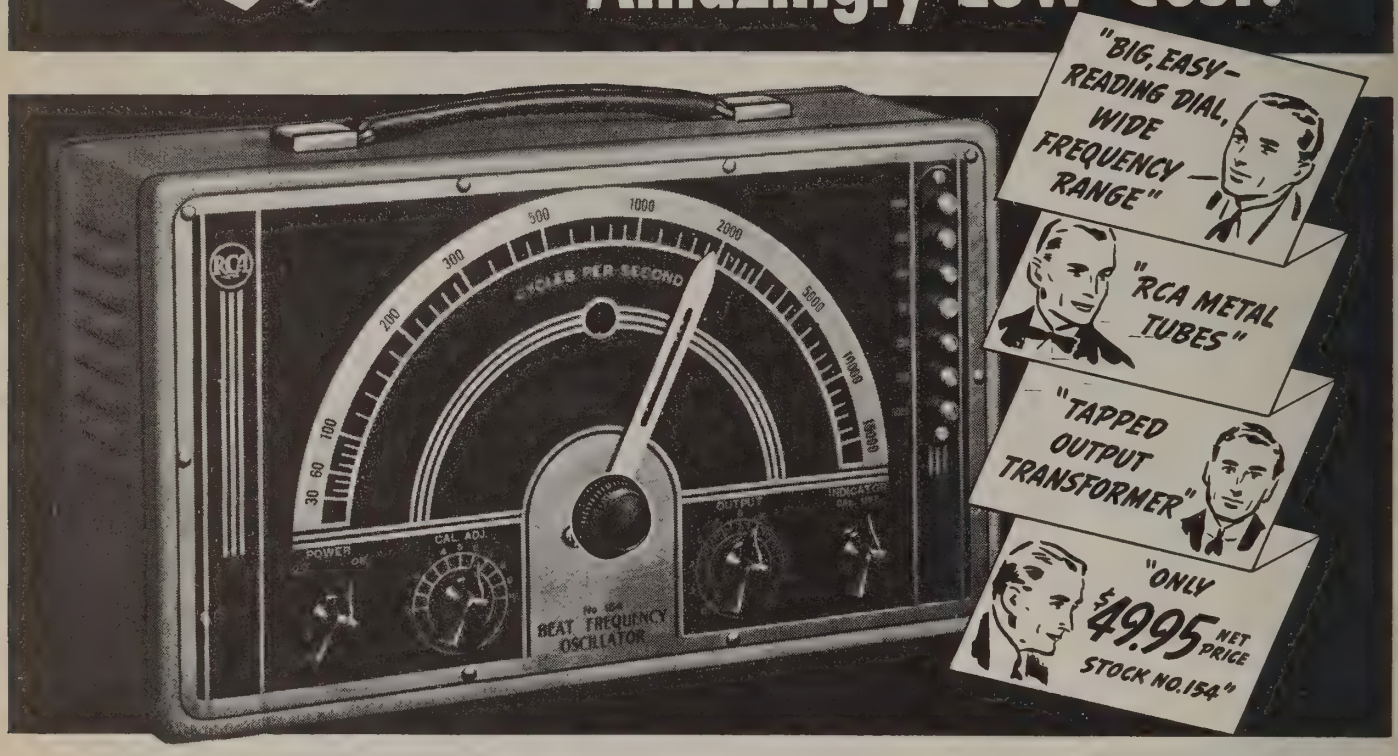
Stock No. 151-2

An easily read, tilt mounted screen is an important feature of this popular-priced RCA Cathode Ray Oscillograph. Using the RCA-902 2-inch tube, this unit provides every important feature needed in a modern Cathode Ray Oscillograph. All controls, including centering controls, are located on the front panel for handy operation. High gain amplifiers for both vertical and horizontal deflection insure high sensitivity —0.5 volts (RMS) per inch of deflection.

SPECIFICATIONS

RADIOTRONS	1 RCA-902 (2-inch), 1 RCA-885, 2 RCA-6C6, 1 RCA-80—Total 5.
SENSITIVITY	0.5 volts (RMS) for full-scale deflection (with amplifier).
AMPLIFIER RANGE AND GAIN	Flat 20-15,000 cycles, Gain 50.
TIMING AXIS (Horizontal Sweep)	30-10,000 cycles
OPERATION	All controls on front panel—complete with calibration screen.
POWER	110-120 volts; 50-60 cycles; 30 watts
DIMENSIONS	Length 13¾", height 9¼", depth 7¾". Weight 14½ lbs.—Special snap handle—sturdy case.
FINISH	Gray wrinkle lacquer with nickel trimming. Reversed etched nickel-silver panel—large, soft rubber feet.

NEW! An Outstanding RCA Beat Frequency Oscillator at Amazingly Low Cost!



● Here's an instrument designed for the service man—in both performance and in price! It's the new RCA beat frequency oscillator which provides a variable frequency source of alternating current voltage from 30 to 15,000 cycles—far more than the range of the finest radio receivers now built.

This instrument is literally alive with splendid features that assure you easier and more efficient operation. Having a tapped output transformer it may be matched to most load impedances and full rated output obtained. It is excellent for testing loudspeakers, cabinet rattles, PA systems, and for running fidelity curves on radio receivers. And remember—these are only a few of its important service applications.

The specifications indicated at the right graphically tell the story of this fine instrument's quality! Its amazingly low price is proof that once again, RCA serves the service man with outstanding value.

CHECK THESE SPECIFICATIONS

Power rating—110-120 V, 50-60 cycles, 35 watts AC. Fuse protection—1.0 ampere. Output frequency—30-15,000 cycles (±1 db from 30 to 10,000 cycles, -2 db at 15,000 cycles). Output voltage—Open circuit, 37.5 volts; 5,000 ohm load, 25 volts; 500 ohm load, 7.5 volts; 250 ohm load, 5.2 volts. Power output—125 milliwatts. Hum level—(approx.) -60 db below maximum output. Distortion—less than 5% rms over entire range. Radiotrons—RCA 6J7 ... fixed rf oscillator; RCA 6J7 ... variable oscillator; RCA 6C5 ... detector; RCA 6J5 ... output amplifier; RCA 5W4 ... rectifier. Dimensions—9½" x 13¾" x 6½", weight 15 lbs.

Over 325 million RCA radio tubes have been purchased by radio users ... in tubes, as in parts, and test equipment, it pays to go RCA All the Way.

RCA presents the Magic Key every Sunday, 2 to 3 P. M., E. D. S. T., on the NBC Blue Network.

PRICES REDUCED ON 4 RCA UNIVERSAL TRANSFORMERS!

These transformers may be used for practically all makes of radio receivers since 1927. Price reductions make them more attractive than ever.

Stock No. 9552. Was $6.00 **Now, $4.50**
For Class B Receivers

Stock No. 9551. Was $5.50 **Now, $4.25**
For 10 and 12-tube Receivers

Stock No. 9553. Was $4.75 **Now, $3.75**
For 5 to 9-tube Receivers

Stock No. 9556. Was $2.00 **Now, $1.45**
For 4-tube Receivers

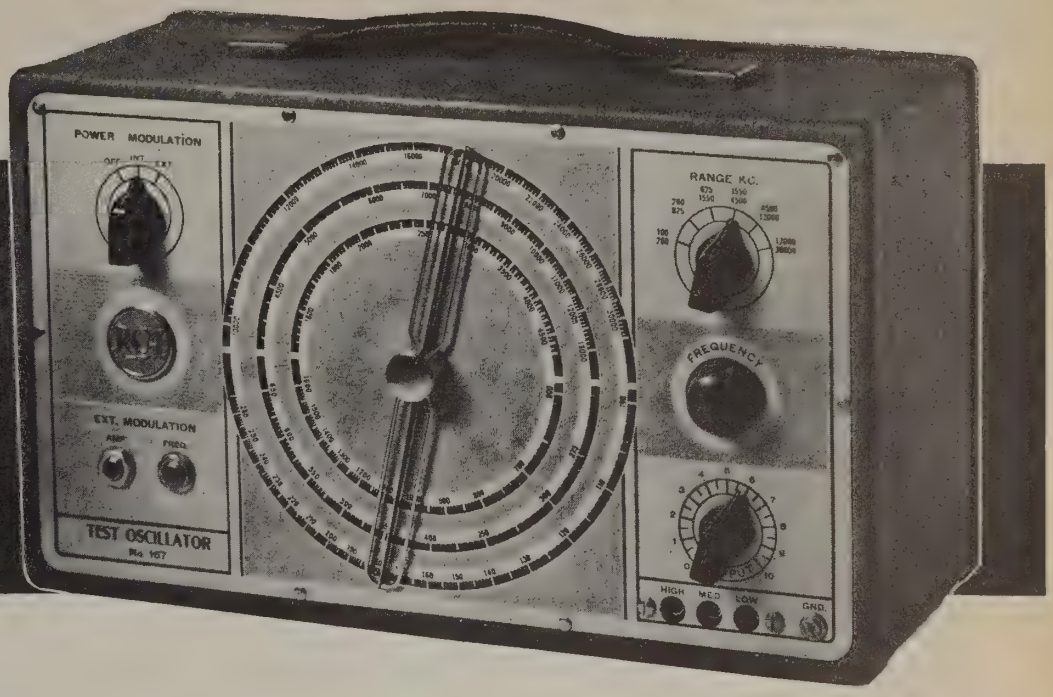
RCA Parts

RCA Manufacturing Co., Inc., Camden, N. J.
A Service of Radio Corporation of America

NEW RCA A-C TEST OSCILLATOR

- 100-30,000 KC.
- 1.0 VOLT OUTPUT
- LARGE DIAL

No. 167
NET PRICE
$34.50
COMPLETE WITH RCA METAL TUBES AND 36-INCH LOW-CAPACITY OUTPUT CABLE

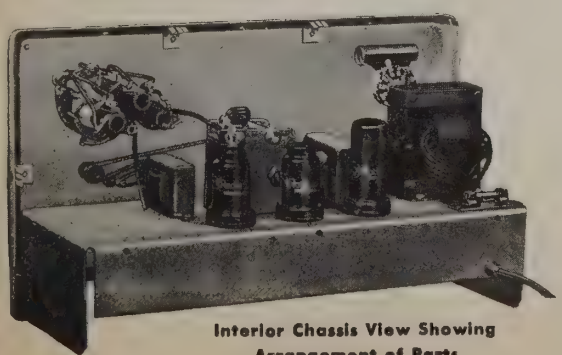


This new instrument is designed to meet every requirement for servicing the most complex radio receiver. Its frequency range is adequate, it has an unusually high output, and the dial scale is accurate and easily read.

With this new oscillator, you are ready to offer your customers a service that is impossible with less modern instruments. This instrument is complete in itself, and in addition is designed so that external frequency modulation may be added for the oscillographic method of servicing.

The giant dial insures an easily read setting, the high frequency range alone covers over 10 inches. RCA all-metal tubes give stability to circuit design and eliminate tube shielding. Six ranges give adequate dial separation and cover every frequency necessary for servicing receivers of all types.

This large, low capacity output cable—36 inches long—is included to enable you to easily connect the output of the No. 167 oscillator to the desired point in the receiver under test.



Interior Chassis View Showing Arrangement of Parts

CHECK THE FOLLOWING FEATURES AND SEE WHAT THIS MODERN OSCILLATOR OFFERS:

- Completely a.c. operated.
- Complete fuse protection.
- Wide frequency range on fundamental frequencies (100-30,000 Kc.). Harmonics of Last Band may be used for ultra H.F. testing.
- High R.F. Output (1.0 volt). Essential for locating trouble on an inoperative or completely misaligned set or for single stage alignment work.
- Three attenuator taps plus fine control gives continuous control of output from minimum to 0.25 volts.
- Internal Modulation of 30% at approximately 400 cycles. Jack provided for external amplitude modulation. Modulation characteristic essentially flat up to 8000 cycles.
- External Frequency Modulator Jack provided for use with sweep condenser tor visual I.F. alignment.
- 400 cycle output of 8 volts available for audio circuit testing.
- Large full vision dial 6½" in diameter gives a scale length of over 50 inches.
- Calibration accuracy—2%.
- RCA all-metal tubes.
- Special Snap Handle—large, soft rubber feet.

POWER SUPPLY RATING: Voltage, 110-120 volts; Frequency, 50-60 cycles; Power Consumption, 30 watts; Fuse Protection, ½ ampere.

RANGE AND APPLICATION: R.F. Frequency, 100-30,000 kc.; Number of Bands, 6; Audio Modulation Frequency, Approximately 400 cycles; R.F. Output—Low, 0.01 volt max.; Medium, 0.25 volt max.; High, 1.0 volt max.; Minimum Signal, 2 Microvolts; Leakage, Negligible; Output Impedances—Low, 10 ohms; Medium, 750 ohms; High, 4000 ohms.

TUBE COMPLEMENT: RCA-5W4, Rectifier; RCA-6C5, Audio Oscillator; RCA-6J7, R.F. Oscillator.

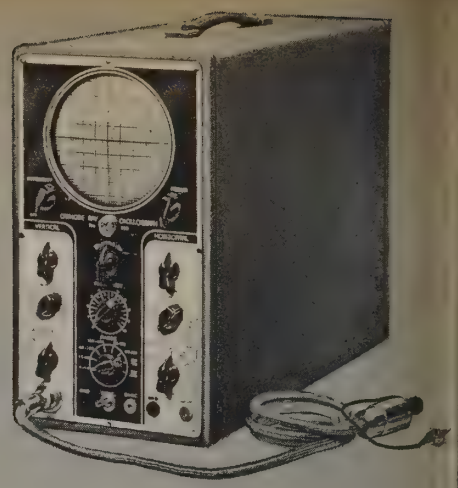
DIAL SCALE: Full vision Airplane Type, 6½ ins. in diameter, over 50 ins. scale calibration; Calibration accuracy 2%.

DIMENSIONS: 13¾" x 9¼" x 6½" deep. Weight, 12½ lbs.

FINISH: Blue-Gray wrinkle lacquer with panel finished in brush and bright chrome.

RCA TELEVISION TEST EQUIPMENT

5-INCH TELEVISION OSCILLOGRAPH



No. 158

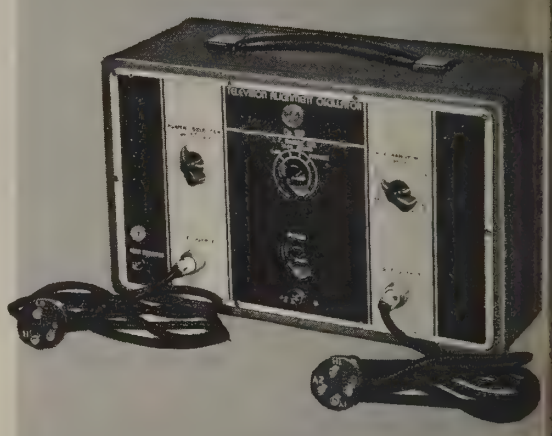
This precision instrument has been designed for service work in accordance with present television receiver development plus anticipation of future television progress—thereby minimizing obsolescence. A special input cable having high input resistance and low capacity is provided. The 5-inch screen gives a large image of unusual clarity preferable for the finest work. All controls—including those for spot centering—are located on the front panel and are of the easily adjusted bar type. A special step-attenuator plus a fine gain control to cover between steps is provided to prevent changes in frequency characteristics at various input levels. Provision has been made for synchronization on positive or negative peaks, an important feature, for in certain television tests it is desirable to choose which is to be used. In television service this capable Oscillograph is ideal for viewing synchronizing and blanking impulses, horizontal and vertical saw-tooth waves, and grid and plate voltages on horizontal and vertical oscillators. It is easily portable and is styled in traditional RCA manner, with a finish that is both attractive and durable. 4 ft. low capacity (8 mmfd.) input cable included.

SPECIFICATIONS

DEFLECTION SENS. AT VERT. AMP. INPUT (max. gain) . . . 0.040 V. RMS/inch (less cable)
DEFLECTION SENS. AT VERT. AMP WITH CABLE 0.3 V. RMS/inch.
DEFLECTION SENS. HORIZ. AMP. . . . .0.56 V. RMS/inch.
FREQ. CHARACTERISTIC VERT. AMP. (max. gain) . . . 5 cycles to 500 KC.
FREQ. CHARACTERISTIC HORIZ. AMP. . . . 5 cycles to 100 KC.
HORIZONTAL SWEEP FREQUENCY RANGE . . . 4 cycles to 22,000 cycles.
FINISH . . . Blue-gray baked wrinkle lacquer with streamlined snap-in handle.
SIZE . . . 14¼" x 8" x 19¼"
WEIGHT . . . 30 lbs.

$147.50 Stock No. 158 NET

TELEVISION ALIGNMENT OSCILLATOR



No. 159

This newly developed instrument is specifically designed for visual alignment of the r-f and i-f circuits in television receivers. When used with a cathode ray oscillograph (such as the RCA Stock No. 158) the selectivity curve of the circuits under test is produced on the television screen. Operation of the television alignment oscillator is surprisingly simple. There are four controls—all easily read and highly accurate—the power selector switch for selecting i-f or r-f operation; two range switches for selecting the desired i-f and r-f channels; and the phase control and switch for adjusting the oscillograph horizontal deflection to provide single image operation. The output frequency sweeps through the r-f and i-f bands at a rate of 60 times per second providing a steady, non-flickering pattern on the oscillograph screen. R-f and i-f coaxial transmission line with proper terminating loads included.

SPECIFICATIONS

OUTPUT SIGNALS . . . Output frequency sweeps through the following bands—RF-43-51 mcs., 49-57 mcs., 65-73 mcs., 77-85 mc. and 83-91 mcs. IF- 7.5 to 15 mcs., (Picture Channel), 7.75 to 8.75 mcs. (Sound Channel.)

OUTPUT VOLTAGES . . . 2 values for each signal approximately 0.3 volts and 0.03 volts.

POWER SUPPLY . . . Self-contained for use on 110-120 V. 60 cycles.
DIMENSIONS . . . H. 9¼", W. 13¾", D. 6½".
WEIGHT . . . 17 lbs.
FINISH . . . Baked Lacquer—fine blue-gray wrinkle.

$130.00 Stock No. 159 NET

No. 157

PIEZO ELECTRIC CALIBRATOR

The Stock No. 157 Piezo Electric Calibrator is a small crystal oscillator unit having fundamental frequencies at 250 KC and 2000 KC. Harmonics of these frequencies are such as to provide exact calibrating frequencies for use in all high frequency work including television service. This unit is complete with its own power supply and acorn type oscillator tube (RCA-955).

Selection of either fundamental frequency is obtained with a two-way switch. An output jack has been included for ease of connection.

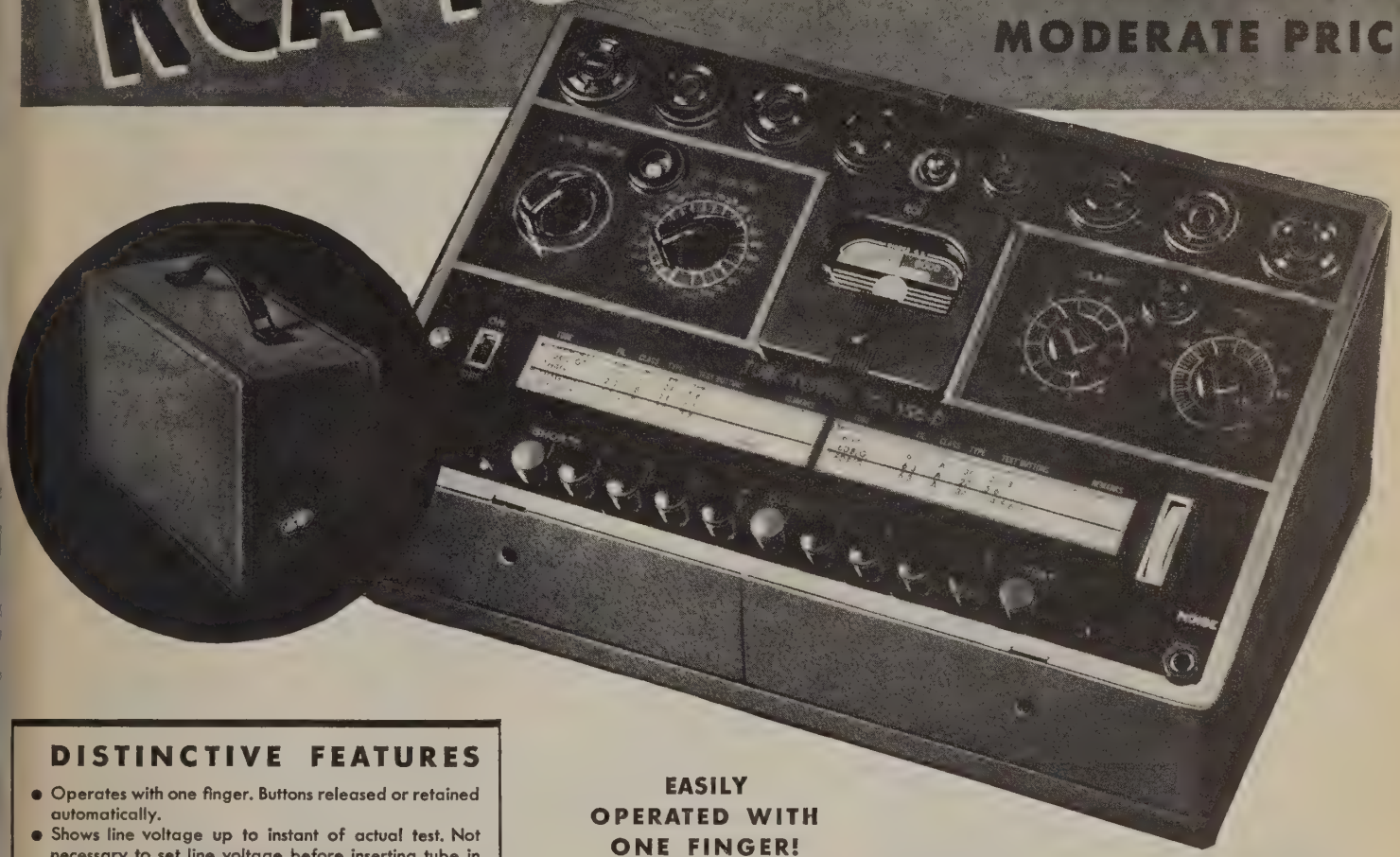
SPECIFICATIONS

FUNDAMENTAL FREQUENCIES . . . 250 and 2000 KC.
ACCURACY . . . ± .05%.
TEMPERATURE COEFFICIENT . . . −15 cycles per 1000 KC per °C.
RADIOTRON . . . 1RCA-955 acorn type.
POWER REQUIRED . . . 110 V.-120 V. 50/60 cycles (A dc source 90-135V. may be used for plate supply for unmodulated output).
POWER CONSUMPTION . . . 2 watts.
CONTROLS . . . Hi-Lo Frequency Switch.
SIZE . . . 5½ x 3⅞ x 2⅝.
WEIGHT . . . 1 lb. 3 oz.

$46.50 Stock No. 157 NET

The New RCA TUBE TESTER

UNUSUAL FEATURES MODERATE PRICE



DISTINCTIVE FEATURES

- Operates with one finger. Buttons released or retained automatically.
- Shows line voltage up to instant of actual test. Not necessary to set line voltage before inserting tube in socket.
- Makes all tests according to RMA standards.
- Tests Magic Eye Tubes for brilliance and opening and closing of eye.
- Tests four-prong and octal-base ballast tubes for noisy welds and opens.
- Tests operation on all types of Gas Tubes, such as OA4-G, OZ4-G, 874, and others.
- Tests every standard type of receiving tube, including ballast tubes, "Loktal" type, Miniature, and Bantam base.
- Spare switch section and socket minimize obsolescence.
- Easily read figures on roll chart. Large type with guide lines indicate proper buttons to be pressed.
- Line voltage adjustment for 100-125 volt line.
- Pilot light indicates power "on" or "off".

Specifications

Dimensions . . . . . 13½"W. 5¾"D. 8"H.
Shipping Weight. 15 lbs. (156-E)
Power . . . . . 105-125 volts; 50-60 cycles; 25 watts.
Finish . . . . . Blue-gray wrinkle finish—lithographed panel.

COUNTER TYPE
No. 156-E
$37.95 NET

PORTABLE TYPE
No. 156-D
$39.95 NET

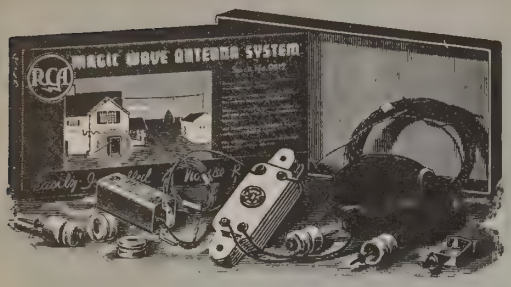
EASILY OPERATED WITH ONE FINGER!

The world's greatest engineering organization plus the world's greatest manufacturer of radio tubes have combined to bring you a tube tester that is actually a long term investment — an instrument which includes features found in no other tube tester.

The RCA Radio Tube Tester includes plus features. It provides for heaters up to 120 volts, spare socket, additional space on the roller chart for up to 100 new tube types, and it even includes a socket for checking miniature lamps (Xmas tree, flashlight bulbs, etc.). Built-in sockets provide for all "Loktal" type, Miniature, and Bantam base tubes. Not a single detail has been overlooked in our effort to bring you the best tube tester buy on the market today.

With all these new features plus the basic easy-testing features that have made it the choice everywhere — we still offer it at the popular price of $37.95. Check all of its features — compare the RCA Tube Tester with any other tester — and see for yourself what a marvelous value it is.

RCA ANTENNAS FOR



No. 9812

No. 395

No. 9685

No. 9845

IMPROVED MAGIC WAVE ANTENNA

A new highly efficient noise reducing antenna for every type of radio installation.

Here's an antenna that literally has "everything" a radio user requires. Noise reduction over all bands, flexibility in installation and high signal pick-up. In no other RCA antenna can you obtain *all* of the following features:

- Noise reduction of both standard and foreign broadcasting bands (530 to 23,000 k.c.).
- Built-in lightning arrester in antenna coupling unit.
- Operates up to 16 outlets from 1 antenna with additional coupling and distribution transformers (only slight reduction in signal strength).
- Easily installed. Completely assembled and soldered.
- Antenna may be from 20 to 120 feet long.
- Transmission line may be any length up to 500 feet.
- 30-foot length of pipe may be used for vertical antenna with underground transmission line.
- Uses magnetite core transformers.
- Can easily be attached to existing antennas.

$5.95

Stock No. 9812 LIST

(Includes complete assembly for single outlet installation)

Stock No. 9849, Antenna Coupling Transformer with Built-in Lightning Arrestor (*for assembling your own kit*) $2.00

Stock No. 9814, Distribution Transformer $3.00
(1 required for each 4 additional receivers)

Stock No. 9813, Set Coupling Transformer $2.50
(1 required for each additional receiver)

395 ANTENNA SYSTEM

At a figure everyone can afford to pay it is a scientifically designed system, operates perfectly with receivers of all types and manufacture and is unusually easy to install. Requires only two supports, 40 feet apart. All parts, including antenna wires, strain insulators, junction box, etc., are assembled and soldered.

Cash in on this low-priced antenna. Recommend it to your customers who need a quality antenna at a popular price.

CONTENTS OF KIT

- 2 Antenna Wire Coils—Each 20 feet long
- 2 Strain Insulators
- 1 Transmission Line—60 feet
- 1 Junction Box
- 1 Receiver Coupling Unit
- 2 Coupling Unit Links
- 2 Nail-On Knob Insulators
- 1 Ground Clamp
- 1 Instrument Sheet

$3.95

Stock No. 395 LIST

Stock No. 12855, Set Coupling Unit for 395 and RK-40 Antennas. List $.75

ADDITIONAL TRANSMISSION LINE List Price

(For types not listed here, see page 17)

Stock No. 9816 60 feet for No. 395, No. 9845, or No. 9852 Antenna $1.50
Stock No. 11817 75 feet Submarine type for No. 9812 Antenna ... 3.20

SPIDER-WEB ANTENNA

A Transoceanic Communications type antenna for the home. The RCA Spider-Web Antenna System gives excellent signal pick-up over the frequency range from 140 to 23,000 kc. By adding the stock No. 9689 High Frequency Kit, the range is increased to 70,000 kc. with full noise reduction. Complete factory assembling and soldering of all parts makes installation rapid and easy. Proper design requires only a span of 38 feet and a vertical clearance of 12 feet.

This antenna consists of a series of doublet antennas and an improved transmission line which gives the utmost in noise reduction of the signal pick-up over an extremely wide range. It is RCA's finest antenna, especially recommended for amateur and short wave reception.

List Price **$8.95**

Stock No. 9685

Stock No. 9689, High Frequency Kit .....List $1.50

RCA VICTOR MASTER ANTENNA

For those difficult installations where extreme local noise cannot be eliminated by the usual noise-reducing antenna, the RCA Victor Master Antenna will often solve the problem. A new unique noise-balancing circuit, which is *individually adjusted* for each installation, gives a high degree of noise reduction, especially when the noise is from near-by electrical devices. This antenna is *not* dependent on location for its noise-reducing qualities.

The frequency range covered is from 540 to 23,000 kcs. including all standard broadcast and foreign short-wave bands. List Price

Stock No. 9845 Complete with Receiver Coupling Transformer.... $6.95
Stock No. 9852 (Model MA) less Receiver Coupling Transformer.. 5.00
Stock No. 9846 Receiver Coupling Transformer..... 1.95

ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.

RCA-RIDER CHANALYST

STOCK NO. 162—STOCK NO. 162A

Note: Trademarks "Chanalyst," "RCA" and "Magic Eye" registered U. S. Pat. Off. by RCA Manufacturing Company, Inc., Camden, N. J.

INSTRUCTIONS

Manufactured by
RCA MANUFACTURING COMPANY, INC.
Camden, N. J., U. S. A.

Printed in U.S.A.

IB-32022-1

AN EXPLANATION OF HOW EASY IT IS TO USE THE RCA-RIDER CHANALYST FOR LOCATING DEFECTS IN RADIO RECEIVERS OF ALL TYPES

It's Important that You Read this Introduction for A Complete Understanding of this Book

Each new year's crop of radio receivers brings with it additional "*headaches*" for the servicemen—new circuits, each with its tricky problems—innovations, new features that follow as a natural result of the march of progress. However, these improvements have placed quite a burden on the time and patience of the servicemen and have previously required that he constantly learn—and unlearn—many technical facts.

This problem is real; but, in the RCA-Rider Chanalyst, its solution has at last been found. The RCA-Rider Chanalyst provides a method of localizing troubles that has universal application to all receiving sets—old or new, simple or complicated of circuit—a method that can be easily learned and simply applied—a method that does not involve new theories. In order that it be universal in every sense of the word, this method is based on a fundamental factor that is common to every receiver—past and present, and to those which are certain to be developed in the future. And there is but one thing that is a common denominator of ALL receivers, that thing is the SIGNAL.

However, in seeking to develop a method of trouble shooting based on testing the signal, one definite limitation was found.

There existed no testing instruments, within reach of the average serviceman's pocket, which would perform such a test. So, was born the idea of the Chanalyst, which is the most sensational development in the history of radio servicing.

This remarkable new instrument localizes troubles by tracing the course of a signal through a receiver from antenna post to loudspeaker voice coil and, quickly and accurately, determines the condition of that signal and other related factors at any and every point. The value of such an instrument is instantly recognized when you stop to consider that in any radio receiver "The Signal's the Thing."

When you are called into a customer's home it is because something has gone wrong with the receiver—something has happened to the signal. There is one thing in which the customer is vitally interested: the restoration of the signal to normalcy, and it is your job as a serviceman to ascertain where the trouble is and then to correct it as quickly as possible. Now the localization of the trouble can be easily accomplished by checking the signal from the moment it enters the receiver at the antenna post and tracing its path throughout the various circuits until it energizes the speaker. If at any point the signal departs from normal, then that particular portion of the set can be identified as the seat of the trouble. It's as simple as that—this system of trouble-shooting now made possible with the RCA-Rider Chanalyst.

With this instrument the servicing of all receivers is reduced to the same level. No matter how complicated the receiver—no matter what type tubes are used—no matter how old or how new the receiver may be—the same simple, fundamental process of trouble localization is employed. Amplification — rectification — frequency conversion—all the functions of the components in a radio receiving system are checked with the greatest ease. With the RCA-Rider Chanalyst you can tell instantly if the signal is at its proper frequency, if it is being stepped-up as it should be, if it takes on hum or is otherwise distorted—if it is present or absent. And more: you can as quickly check the various operating and control voltages that influence the signal in its passage through the set—in all types of receivers. All this you can do without disturbing the normal operation of the receiver. The receiver power supply can be checked in its entirety; the condition of resistors and condensers can be determined without their tedious, time-taking removal from the circuit.

It makes no difference how efficiently troubles have been diagnosed in your service shop before this, or how quickly the work has been done, we claim that the use of the RCA-Rider Chanalyst will appreciably increase your efficiency and speed. It will solve those "TOUGH" ones in a surprisingly short time. No matter how good a serviceman you may be in locating the part in a receiver that is causing the signal to depart from normal, a certain amount of guess-work is inevitable. As a matter of fact, the more experienced the serviceman, the more he is inclined to depend upon guessing. Although this practice might appear to save time there inevitably comes along "THAT JOB" which cannot be "GUESSED" and the job-average time goes sky-high. Remember, there is no guess-work in servicing when the RCA-Rider Chanalyst is used—you know immediately and positively all the factors that influence

the signal in its course through the receiver. So, if you but follow the system prescribed for the Chanalyst on every job, you will actually save hundreds of hours each year.

Although the RCA-Rider Chanalyst was introduced to the radio servicing industry only a relatively short time ago, it has already been proved in the hands of servicemen and is, without any doubt, the most enthusiastically received development in the history of radio servicing instruments. In the following pages you will find a description of the Chanalyst and how it is used in tracing down trouble in a receiver. Analyze what this instrument can do for you and we know that you will see why the Chanalyst has brought forth such a volume of sincere praise from servicemen in all parts of the country.

Then read how the actual tests on different parts of a receiver are performed. And remember, all these tests and checks can be made without disturbing the functioning of the receiver itself. When you have all the facts, you will not need an expert to demonstrate the Chanalyst to you. Take one of your repair jobs to your jobber and actually demonstrate the Chanalyst to yourself. We are so firmly convinced of the simplicity of operation of this instrument and its great worth to the servicemen that we are willing to "LEAVE IT UP TO YOU" after the RCA-Rider Chanalyst has thus performed "IN YOUR OWN HANDS."

Men all over the country, who are now using the Chanalyst daily, are proving our claims to be true. Prove to yourself by going to your jobber's and using the instrument on an actual job. Then you, as have hundreds of other servicemen before you, will want a Chanalyst to make your work easier, quicker, more accurate, and, last but not least, to make it more profitable.

THE RCA-RIDER CHANALYST CHECKS EACH PART BY CHECKING ITS FUNCTION

The RCA-Rider Chanalyst is the pioneer instrument offered to the serviceman that enables true dynamic and functional testing of radio receivers. *And this means any radio receiver,* old or new, and even those of the future. True dynamic testing means testing each and every circuit—each and every tube while the receiver is operating and *without interfering with the performance of the receiver.* This book explains how simply these functional tests are made—*tests that no other instrument can make!*

1. TUBE TESTING—Octal, loktal, metal or glass, prongs on bottom, top or sides, tubes of all types, past, present or future—*the Chanalyst tests one and all under true dynamic conditions—right in the receiver—by checking the function of the tube in its circuit and under its operating conditions.* The Chanalyst tells you how much gain an amplifier tube has—r-f, i-f, a-f, it checks them all! A tube may work better in one stage than in another. A true dynamic test recognizes this fact. With the Chanalyst you can pick the best tube for a specific function under the exact operating conditions present in the receiver you are testing. . . . If it is a mixer tube, the Chanalyst checks the conversion gain—if it is an oscillator, the Chanalyst measures the signal output at any frequency in its operating range. *Whatever the function of the tube, the Chanalyst provides you with a true functional test of its operation!*

Noise, gas, microphonics, and other tube defects are instantly revealed by the Chanalyst, not by some artificial test, not by some arbitrary combination of voltages and loads, *but by testing the tube under the exact conditions that the tube functions in the receiver in which it is used. . . .* And these tests are made quickly, as fast as you can move a probe from one point to another. . . . No buttons to push—no charts to read. You will never have to buy adaptors for new tubes.

2. POWER CONSUMPTION TESTS—True dynamic testing of power supply systems means measuring the receiver power consumption while it is in operation under its actual load. The Chanalyst does just that. . . . No more waiting for the odor of burning tar to indicate that the receiver power transformer is shorted; the Chanalyst reveals the short instantly. No more risking prolonged high-voltage surges on condensers due to open circuits in power supply systems. . . . The Chanalyst points out these, too. . . .

3. GAIN-PER-STAGE TESTS — True dynamic gain in transformers and tubes is measured under actual operating conditions by means of the Chanalyst! With the Chanalyst you measure signal amplification in all parts of the receiver by feeding the signal to the INPUT terminals of the receiver and noting the signal level in every amplifying stage. With the Chanalyst, you make all these measurements faster and more accurately than with all other existing service equipment.

4. OPERATING VOLTAGE MEASUREMENTS—How often have you wanted to read d-c operating voltages while the receiver was in operation and receiving a signal? *Only in this manner can you determine the actual AVC voltage reaching that controlled tube!* True dynamic operating voltage measurements are those made upon an operating receiver with the signals in the circuit. The RCA-Rider Chanalyst permits you to measure such voltages without interfering with the operation of the receiver—without reducing the voltages—without affecting the signal. ANY AND ALL D-C VOLTAGES, WHETHER POSITIVE OR NEGATIVE, CAN BE CHECKED INSTANTLY—EASILY—ACCURATELY. It checks gassy tubes, too. Shows you how distortion gradually builds up as gas increases, by measuring the change in voltage across the grid resistor in the tube circuit.

AFC alignment is ordinarily difficult; not with the Chanalyst. With the Electronic Voltmeter, the circuit can be easily and accurately aligned. It checks oscillator performance, too. Just a turn of the gang condenser with the Electronic Voltmeter connected instantly reveals "DEAD SPOTS," uneven output at any portion of any band of an all-wave receiver clear up to 100 megacycles. That's true fundamental testing! This RCA-Rider Chanalyst book tells you how simply these tests are made.

5. TESTING SUPERHETERODYNE OSCILLATORS—The RCA-Rider Chanalyst provides a complete dynamic test of superheterodyne oscillators. The Chanalyst tells you the operating frequency at which the oscillator is working,—if the oscillator is tracking—if it drifts during operation—if its output is constant or otherwise. . . . And if the oscillator is intermittent, if it "CUTS-OUT," the Chanalyst tells you so. . . . "NO GUESS-WORK." . . . The RCA-Rider Chanalyst give you *complete, definite information* of the type you *must* know to do good servicing.

6. TESTING CONDENSERS—The only real dynamic test of a condenser is that which determines just how well it does its job in the receiver in which it is installed. This the Chanalyst tells you . . . WITHOUT removing the condenser from the set. If it is a by-pass condenser, whether in an r-f, i-f or a-f system, the Chanalyst shows you definitely and conclusively whether it is performing its function, whether a filter condenser really filters, whether a coupling condenser really does couple. And if it leaks, the Chanalyst shows this, too.

In other words, *the RCA-Rider Chanalyst tests all condensers,* whether in r-f, i-f, oscillator, a-f or filter sections of the receiver, *not* by some arbitrary test, but by showing you whether or not they are functioning properly in the receiver.

7. LOCALIZING DISTORTION—If reception is distorted, some component in the receiver under test is not performing its proper function. By combining the exclusive Chanalyst signal tracing method with a simple aural or visual test, the fault is immediately localized. You listen to the actual signal, you hear it when it is clear and, as soon as you reach the section where the distortion originates, you hear the distortion. You have then localized the trouble. What could be simpler?

8. LOCALIZING NOISE—Any receiver component can cause noise. But no matter where the fault arises, the Chanalyst points it out, definitely and unmistakably. *And you can localize the trouble faster than by any other method.* Just read the simple instructions in the book.

9. INTERMITTENT OPERATION—Only the Chanalyst solves the problems of intermittent receiver servicing . . . the greatest "HEADACHE" in the business. With the Chanalyst you can divide a receiver into several sections and test them simultaneously, under actual operating conditions, WITHOUT disturbing a single circuit or affecting the performance of the receiver. When the receiver 'CUTS-OUT," a glance at the Chanalyst indicator tubes tells you just where the trouble starts. *No other test instrument can do this.*

These are only a few of the multitude of true dynamic and functional tests possible with the Chanalyst. Read this book from cover to cover. Note how others have profited by using the Chanalyst. *The Chanalyst will do as much for you.* Don't handicap yourself. You can't make money servicing if you aren't properly equipped. Go to your jobber and try the RCA-Rider Chanalyst. Compare it with any other test instrument . . . or group of test instruments.

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IMPORTANT PRELIMINARY INSTRUCTIONS

Do not attempt to use the RCA-Rider Chanalyst without first reading the following instructions:

POWER SUPPLY—Before plugging in the Chanalyst, check to see that the line frequency and voltage agrees with the rating stamped on the serial plate located at the rear of the cabinet. The RCA-Rider Chanalyst, Stock No. 162, is designed for 110-volt, 50 to 60-cycle operation; and the RCA-Rider Chanalyst, Stock No. 162A is designed for 110-volt, 25-cycle operation.

GROUND LEAD—The ground lead of the Chanalyst must be clipped to the chassis or other voltage return point in the receiver under test.

ELECTRONIC VOLTMETER — The center zero should be set by means of the small knob, marked "ZERO" located directly under the "METER RANGE" switch. The probe point should be touched to the front panel while this adjustment is made. The voltmeter must always be used in conjunction with its special voltmeter cable (blue).

WATTAGE INDICATOR—This channel must be used only in connection with receivers operating on alternating current power.

STRAY PICK-UP—When using the probes, take care to hold each one with the fingers well back from the probe tip. This avoids extraneous pick-up due to the high sensitivity of the channels.

When testing circuits, place the probe point directly on the tube prongs or grid caps. The tube prong may not make good contact with the socket or the grid lead connection may become unsoldered from the grid cap. In this way, we can tell if the signal or voltage under test is actually reaching the tube elements.

When the point at which the signal or voltage disappears is noted, we can check back with the probe point to intermediate connections to find out precisely where the trouble is first present. This check will uncover broken connections, rosin or corroded joints, open-circuited leads or components.

Be sure to make good electrical contact with the probe point. In some cases it may be necessary to scratch the metal with the probe point to get a satisfactory connection.

RCA-RIDER CHANALYST

STOCK No. 162 — STOCK No. 162A

The RCA-Rider Chanalyst is a device whereby it is possible to trace the passage of a signal through a radio receiver, establish the character of the signal in any portion of the radio receiving or amplifying system, and to identify the nature and location of the fault existing in the receiver or amplifier with maximum accuracy and the greatest possible speed. To accomplish this end, the RCA-Rider Chanalyst contains a series of electrical circuits whereby it is possible to probe in *every* circuit of the receiver *without interfering with its operation.*

The manner in which the RCA-Rider Chanalyst is used for trouble shooting is as follows:

1. To check the power consumption of the radio receiver under test.
2. To feed a signal of known frequency into the receiver, across the antenna-ground terminals.
3. To check the passage of this signal through the r-f, i-f and audio systems of the receiver. inclusive of the operation of the receiver oscillator, and note its general character.
4. To measure d-c voltage in whatever portion of the receiver comes under suspicion as a result of the conclusions derived from the signal tracing test.
5. To apply other tests in accordance with the conclusions arrived at after the signal tracing test.

Of utmost value during the process of trouble localization is the fact that as a result of the design of the Chanalyst *both signal and voltage* conditions existing in *any* portion of the radio receiver *can* be simultaneously checked and *nothing need be taken for granted.*

What is in the RCA-Rider Chanalyst—The Chanalyst contains five separate electrical circuits. These are:

1. The RF-IF Channel.
2. The Wattage Indicator or Power Consumption Indicator Channel.
3. The Oscillator Channel.
4. The Audio Frequency Channel.
5. The D-C Electronic Voltmeter Channel.

These names are used more as a means of identification than to state the exact operating scope of the channels. This will become evident from the description of the exact nature of these channels and the wide scope of their application.

The speed with which you can work is as fast as you can move a test probe to whatever points in the receiver you wish to check.

No matter how rapidly you have been able to locate trouble in the past, the RCA-Rider Chanalyst will enable you to reduce this time by an almost incredible margin. The tests you have not been able to make heretofore now can be made with the Chanalyst.

ELECTRICAL SPECIFICATIONS

Channels—

1. RF-IF ..... 3-Stage TRF Amplifier
   Frequency Range ..... 95-1700 kc
   Output Indication ..... Magic Eye
2. Oscillator ..... 1-Stage TRF Amplifier
   Frequency Range ..... 600-15,000 kc
   Output Indication ..... Magic Eye
3. AF ..... 1-Stage Audio Amplifier
   Frequency Range ..... 150-50,000 cycles
4. Electronic Voltmeter
   Input Resistance ..... 10 megohms
   Voltage Ranges ..... 0-5, 25, 125, 500 d.c.
   Center Scale ..... Measures Either Polarity
   Output Indication ..... Meter
5. Wattage Indicator
   Power Range ..... 25-250 watts
   Output Indicator ..... Magic Eye

Power Rating

Stock No. 162 ..... 105-125 volts, 50-60 cycles, 60 watts
Stock No. 162A ..... 105-125 volts, 25-40 cycles, 60 watts

Tube Complement—

RF-IF Channel

(1) RCA-6SK7 ..... 1st RF-IF Amplifier
(2) RCA-6K7 ..... 2nd RF-IF Amplifier
(3) RCA-6K7 ..... 3rd RF-IF Amplifier
(4) RCA-6H6 ..... RF-IF Diode*
(5) RCA-6E5 ..... Magic Eye

* Section D1 of Diode used in Wattage Indicator.

Oscillator Channel

(1) RCA-1852 ..... Amplifier
(2) RCA-6Q7 (Section Ds) ..... AF Diode*
(3) RCA-6E5 ..... Output

* D3 Section of the RCA-6Q7 used in AF channel.

AF Channel

(1) RCA-6Q7 ..... AF Amplifier*
(2) RCA-6Q7 ..... AF Diode†
(3) RCA-6E5 ..... Magic Eye

* Triode Section of RCA-6Q7.
† D3 Section of RCA-6Q7.

Electronic Voltmeter

(1) RCA-76 ..... V.M. Amplifier

Wattage Indicator

RCA-6H6 ..... Wattage Indicator Diode*
(3) RCA-6E5 ..... Magic Eye

* D1 Section of RCA-6H6 RF-IF Diode.

Power Supply

RCA-6X5G ..... Rectifier

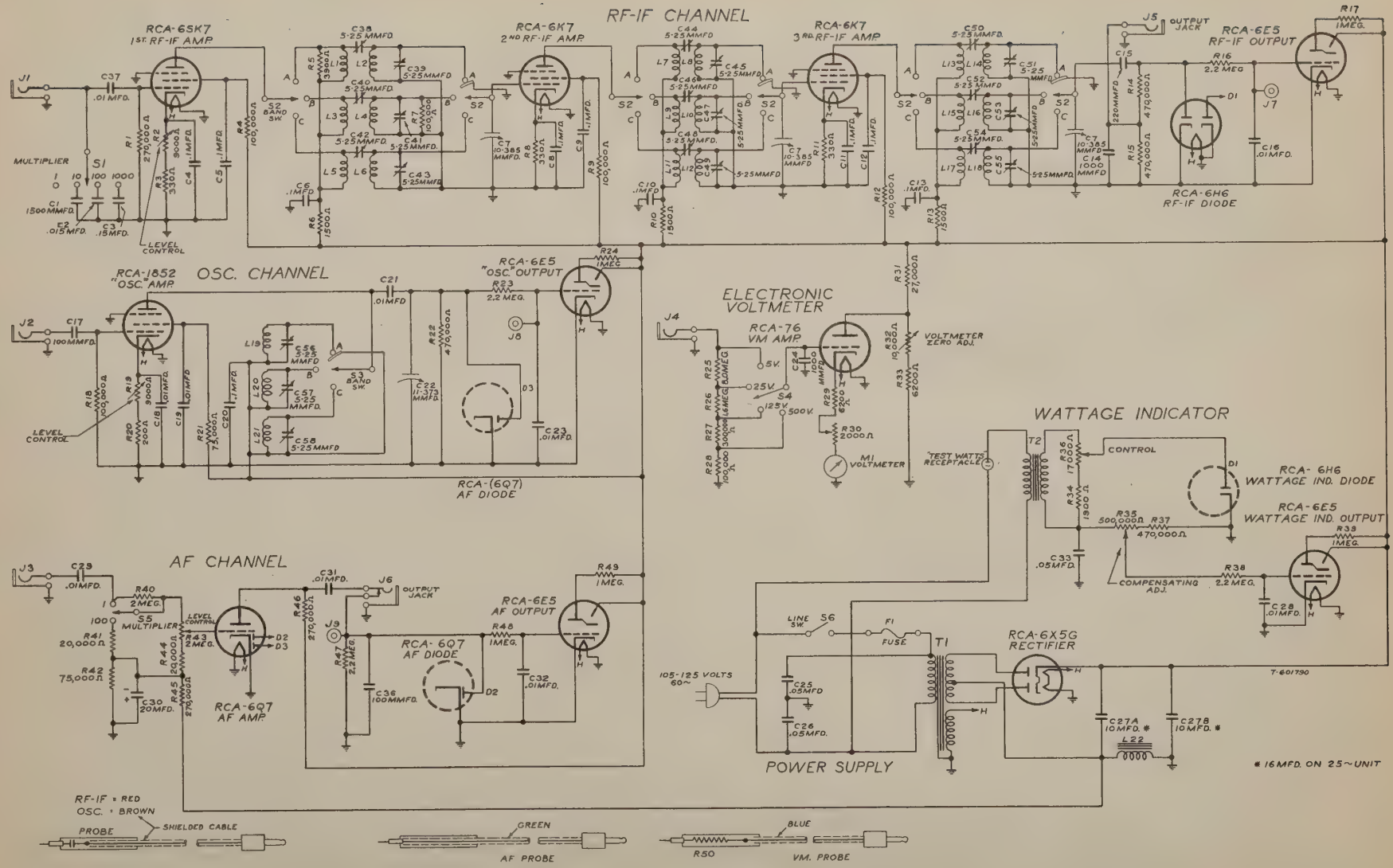

RF-IF CHANNEL
RCA-6SK7 1ST. RF-IF AMP
RCA-6K7 2ND RF-IF AMP
RCA-6K7 3RD. RF-IF AMP
RCA-6E5 RF-IF OUTPUT
RCA-6H6 RF-IF DIODE
OUTPUT JACK
MULTIPLIER
LEVEL CONTROL
OSC. CHANNEL
RCA-1852 "OSC." AMP
RCA-6E5 "OSC." OUTPUT
RCA-(6Q7) AF DIODE
ELECTRONIC VOLTMETER
RCA-76 VM AMP
VOLTMETER ZERO ADJ.
M1 VOLTMETER
WATTAGE INDICATOR
"TEST WATTS" RECEPTACLE
CONTROL
RCA- 6H6 WATTAGE IND. DIODE
RCA-6E5 WATTAGE IND. OUTPUT
COMPENSATING ADJ.
AF CHANNEL
RCA-6E5 AF OUTPUT
RCA-6Q7 AF DIODE
RCA-6Q7 AF AMP
LINE SW.
FUSE
RCA-6X5G RECTIFIER
105-125 VOLTS 60~
POWER SUPPLY
T-601790
* 16 MFD. ON 25~ UNIT
RF-IF = RED
OSC. = BROWN
PROBE
SHIELDED CABLE
GREEN
AF PROBE
BLUE
R50
VM. PROBE

Figure 1

THE RF-IF CHANNEL

The RF-IF Channel shown in schematic form in Figure 1 is a three-stage tuned radio frequency amplifier, terminating in a diode detector and an electron-ray indicator tube (Magic Eye). This entire assembly constitutes a three-band receiver operative over a frequency range from 95 kc to 1700 kc, thus embracing the complete intermediate frequency range found in commercial broadcast receivers and the conventional broadcast band. Some of the frequencies within the i-f band are also identified as the "weather" band in broadcast receivers. The three frequency bands covered by this channel are:

Band A 95 kc to 260 kc.
Band B 240 kc to 630 kc.
Band C 600 ck to 1700 kc.

These three bands are identified upon the frequency scales engraved upon the panel and the "RF-IF BAND SWITCH"; also bears identifying letters. The various controls associated with the RF-IF Channel are shown in Figure 2.

Figure 2

The jack identified as J1 in the schematic is the "RF-IF" input jack shown in the lower left hand corner of the rf-if assembly of controls in Figure 2. This is the jack that accommodates the telephone plug end of the rf-if pick-up cable. This cable (red) contains a very small capacity of approximately 1.0 micromicrofarad at the tip end, within the probe handle.

The RF-IF Channel also contains an output jack J5 in Figure 1, which is connected across a portion of the diode rectifier load. This jack is located at the rear of the chassis, therefore is not visible in Figure 2. It is identified upon the serial plate located in the rear of the cabinet as "RF-IF."

The tip jack shown in Figure 2, adjacent to the "RF-IF" input jack, connects to the "RF-IF" Magic Eye control grid and is installed on all RCA-Rider Chanalysts.

THE RCA MAGIC EYE—If you examine the schematic in Figure 1, you will note that the RF-IF assembly of parts comprises what is a complete t-r-f receiver, with the RCA-6E5 electron-ray tube (Magic Eye) as the final output indicator. Indications upon the Magic Eye appear as changes in the shadow angle. Without any signal input into the RF-IF Channel, the RCA-6E5 Magic Eye is wide open, that is, maximum shadow angle exists. When a signal voltage is present across the input terminals and the channel is resonated to the signal frequency, the indicator tube shadow angle decreases and approaches zero, that is, the Magic Eye closes. Thus, the variations in shadow angle upon the indicator tube can be interpreted in variations of signal voltage at the input of the channel.

If the signal voltage at the input of the channel is sufficiently great, the eye "overlaps." Reducing the signal voltage at the input of the channel causes the eye to open or the shadow angle to increase. Thus the RCA-6E5 Magic Eye is a reference indicator which shows the presence of a signal at the input of the channel.

"MULTIPLIER" AND "LEVEL" CONTROL—By means of the combined action of the "MULTIPLIER" and "LEVEL" control it is possible to check or to compare signal voltages over a calibrated ratio of 10,000 to 1. The "LEVEL" control covers a continuous range of 10 to 1 and the "MULTIPLIER" covers a range of 1000 to 1 in three fixed steps which vary by a factor of 10. Therefore, it is possible by means of these two controls to maintain a constant indication upon the "RF-IF" Magic Eye when the signal voltage at the input of the RF-IF Channel (the tip of the RF-IF (red cable) probe) varies over a range of 10,000 to 1.

In turn, it is possible to approximate the change in signal voltage values at the input of the Channel by noting the adjustment of the 'MULTI-

PLIER" and "LEVEL" controls required to maintain a constant indication upon the Magic Eye. To secure proper action of the "MULTIPLIER" control, the RF-IF pick-up (red) cable must be used.

When the rf-if pick-up cable is not used and contact is made by means of a direct connection with the grid circuit of the first amplifier tube, as when using the AF (green cable) probe, the "MULTIPLIER" is not used. Here the "LEVEL" control provides for operation over a range of a 10-to-1 change in signal voltage.

so that much smaller values of signal voltage can be used. As a matter of fact, the sensitivity of the RF-IF Channel at the control grid of the first amplified tube, that is, using a direct probe, is between 50 to 70 microvolts to close the eye. Certain operations to be described later can be carried out with as little as 5 to 10 microvolts input to the RF-IF Channel.

If at any time only the "LEVEL" control is used and the reference setting is obtained with the "LEVEL" control at some figure other than "1," the ratio between the second setting required to re-

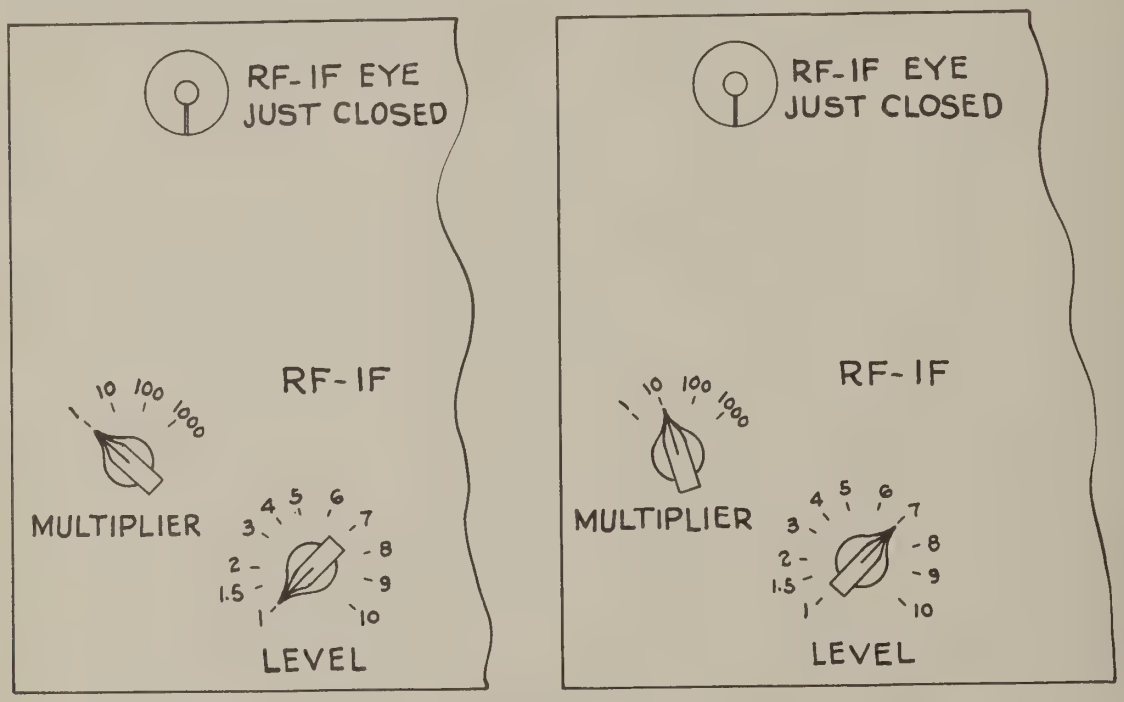


Figure 2a

The voltage gain of an r-f or i-f transformer, or tube, or complete stage is indicated on the RF-IF 'MULTIPLIER" and "LEVEL" controls. For example, Figure 2A shows typical settings of these controls when checking the signal first at the grid, and then at the plate of an i-f tube. With the rf-if (red cable) probe at the grid of the i-f tube, both controls are set at "1," and the test oscillator output is adjusted to just close the "RF-IF" Magic Eye. The rf-if probe is then moved to the plate of the i-f tube without disturbing the test oscillator. The "RF-IF" Magic Eye will now overlap, and the rf-if "MULTIPLIER" and "LEVEL" controls should be readjusted so the "RF-IF" Magic Eye just closes. In this example, the "MULTIPLIER" is set at 10 and the "LEVEL" control is set at "7," indicating a gain of 70 from grid to plate on the i-f tube.

As a general rule, a signal of about 5 to 7 millivolts is required at the probe tip to close the Magic Eye when the RF-IF (the red cable) probe is used and the "MULTIPLIER" and "LEVEL" controls are at "1." However, as you will see later, it is not necessary to operate with the eye closed, store the indicator to the original reference value and the original setting is the gain in voltage. For example, if original reference indication upon the Magic Eye or the voltmeter is secured with the "LEVEL" control at "2" and the second setting of the "LEVEL" control is "9," the gain in voltage is 9/2 or 4.5. If the original setting of the "*level*" control was "1.5" and the second setting was "7.5," then the gain in voltage is 7.5/1.5 or 5, etc.

The accuracy of these gain calibrations is within about 20 percent. You may, of course, find if a quantitative check is made, that the accuracy is greater because the Multiplier capacities are held to within a 5 percent tolerance, but in general, the aforementioned variation is quoted. This degree of accuracy is sufficient for all general use, particularly for service work.

ELECTRONIC VOLTMETER IN RF - IF CHANNEL—Chanalysts are equipped with a pin-jack located on the front of the panel adjacent to the RF-IF input jack. The purpose of this jack is to enable connection of the Electronic Voltmeter to the control grid of the RF-IF Magic Eye.

This connection is made by inserting the metal tip of the Voltmeter pick-up cable (blue) probe into the pin jack, and the plug end of the cable into the Voltmeter jack.

The purpose of the connection is to enable the use of the voltmeter as a reference indicator in addition to the RF-IF Magic Eye, particularly with weak signals.

In addition, the meter type reference indicator functions in excellent manner when the Chanalyst is used for checking antenna pick-up. A similar pin jack is located in the Oscillator Channel and its use is discussed in the chapter devoted to the Oscillator Channel.

APPLICATIONS OF THE RF-IF CHANNEL— In general, the applications of the RF-IF Channel are as listed below. These applications naturally embrace all minor uses which come within these main headings. Examples will be given later.

1. *As a conventional comparison broadcast receiver* (without audio amplifier), substantially free from distortion and which operates over a range from 95 kc to 1700 kc. (To listen to the signal a pair of high impedance headphones are plugged into the output jack, J5 in Figure 1, or if desired, a separate audio amplifier may be connected to this jack so as to amplify the signal still further. The manner in which the Audio Frequency Channel available in the Chanalyst can be used as this supplementary amplifier is described elsewhere. When used as a conventional broadcast receiver, any wire used as the antenna is connected to the input circuit via any telephone cable which is inserted into the "RF-IF" input jack.

2. *As a means of checking antenna pick-up* operated over the frequency range from 95 kc to 1700 kc, with the voltmeter connected to the RCA-6E5 Magic Eye control grid and with the channel calibrated in signal input and d-c voltage at the Magic Eye control grid. (As a receiver, the various channels are substantially flat in gain over the various ranges and will develop about 1.0 volt d-c at the Magic Eye control grid for each 12 microvolts of signal at the first r-f tube control grid.)

3. *As a means of establishing antenna pick-up* of signals from broadcast transmitters operating over the 95 kc to 1700 kc frequency range.

4. *As a means of ascertaining the approximate frequency* of any unknown signal, modulated or unmodulated and lying within the 95 kc to 1700 kc range. The source of the unknown signal is of no consequence.

5. *As a resonated vacuum tube voltmeter* to establish the relative gain or loss of r-f, i-f and oscillator signals present in the different parts of a radio receiver, and to check the condition of alignment.

6. *As a means of establishing the presence, absence, and level of signals* at points in a radio receiving system where they are supposed to exist and also their presence where they are not supposed to exist. The latter includes conditions when signals of one frequency find their way back into circuits tuned to other frequencies.

7. *As a means of listening to or viewing the signal* to check for hum, distortion or noise in any portion of the r-f or i-f systems of a radio receiver, when these systems operate within the frequency range of 95 to 1700 kc. This can be done by listening to the signal with headphones or observing it with an oscillograph.

8. *As a means of establishing the origin of noise* developed in the r-f or i-f system of a receiver.

9. *As a means of identifying an oscillating r-f mixer or i-f stage* in a receiver.

10. *As a heterodyne detector.*

11. *As a means of alignment and tracking* without rocking and *as a means of checking automatic frequency control alignment.*

In these eleven general applications of the Chanalyst will be found myriad tests which may be required during the process of trouble shooting.

THE OSCILLATOR CHANNEL

The controls associated with the Oscillator Channel are shown upon the photographic view in Figure 3 and the schematic wiring diagram is shown in Figure 1. This Channel is a single-stage, three-band tuned radio frequency amplifier, terminating in a diode detector and a Magic Eye. It operates over the frequency range from 600 kc to 15,000 kc in three bands:

Band A 600 kc to 1700 kc.
Band B 1650 kc to 4900 kc.
Band C 4800 kc to 15,000 kc.

These bands are identified upon the tuning scale engraved upon the panel and also upon the "OSC. BAND SWITCH." The input jack J2 in Figure 1 is shown in Figure 3 in the lower right hand corner of the assembly of Oscillator Channel controls, directly beneath the "OFF-ON" switch. The small pin jack located to the left of the Oscillator Channel input jack enables connection of the Electronic Voltmeter to the control grid of the Oscillator Channel Magic Eye.

The Oscillator Channel pick-up cable (brown) and probe is similar to that used for the RF-IF Channel. In general, the Oscillator Channel is like the RF-IF Channel, except that it operates over a different frequency range and is less sensitive.

Figure 3

Since this channel is intended primarily for application in conjunction with the oscillator in the receiver, lower sensitivity is satisfactory. The operation of the indicator in this system is identical to that of the RF-IF Channel in that the Magic Eye is a reference indicator used to show the presence of the signal at the input and also to enable correct tuning to this signal. As such, it serves to check the frequency of the signal voltage applied to the input of the Channel.

THE OSCILLATOR LEVEL CONTROL—The function of the Level Control in the Oscillator Channel is primarily to enable correct tuning of the Channel with the Magic Eye as the reference indicator. By manipulation of the Level Control it is possible to reduce the gain of the Channel so that the eye does not overlap and correct resonance can be obtained between the tuned circuit in the Oscillator Channel and the frequency of the input signal voltage.

USES OF THE OSCILLATOR CHANNEL—Some of the general applications of the Oscillator Channel are listed below. Specific tests are given elsewhere.

1. *Compare signal voltage levels* from oscillators.
2. *Check the frequency of signal voltages,* as for example, the frequency of the signal voltage developed by the oscillator tube in a radio receiver.
3. *As a resonated vacuum tube voltmeter* for qualitative comparison of voltages in excess of .1 volt.
4. *As a constant monitor of the receiver oscillator output* and frequency during checking of an intermittent superheterodyne receiver.
5. *As a frequency monitor and voltage level monitor* for signals secured from a signal generator or test oscillator.

Once again we remind you that in these five general applications of the Oscillator Channel will be found all of the individual tests which are required to locate trouble in oscillating systems of radio receivers operative over the 600 kc to 15,000 kc range.

THE AUDIO FREQUENCY CHANNEL

The Audio Frequency or AF Channel is very easy to understand. Like the RF-IF and the Oscillator Channels, it is a basic network. In schematic form it is shown in Figure 1, and the location of the AF Channel controls and indicator tube (Magic Eye) upon the panel is shown in Figure 4. The "AF" indicator tube (Magic Eye) is located adjacent to and to the right of the RF-IF Magic Eye. Next to the AF Channel indicator is the "AF" level control and to the right of this level control is the multiplier. Both of these last two controls bear similar identifying names upon the schematic. The input a-f jack, shown in J3 in Figure 1, is located at the bottom of the panel and is marked "AF." The pick-up probe with cable used for this channel is shown in schematic form in Figure 1, and is a direct lead within a shielded braid.

An output jack, J6 in Figure 1 is shown connected into the input circuit of the AF Channel diode. A pair of high impedance phones (such as crystal phones), an oscillograph or another amplifier may be plugged into this jack in order to make audible, visible, or still further to amplify the signal present in the output circuit of the AF Channel.

When a device is plugged into this output jack, the a-f diode and indicator are automatically disconnected. The small pin jack accessible at the rear of the chassis is provided for use when the Chanalyst is assembled in a rack mounting and it is desired to extend the connections in the rear, to jacks located at the front of the bench. This pin jack provides contact with the connection in the audio output jack, which joins the diode plate.

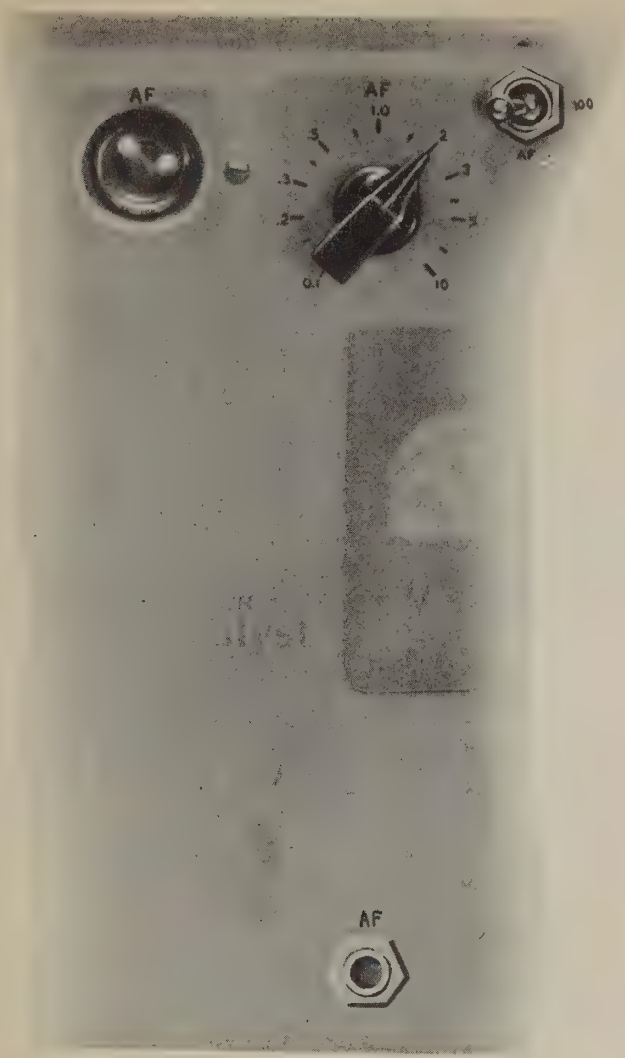


Figure 4

The output jack is identified upon the serial plate at the rear of the chassis.

THE LEVEL CONTROL AND MULTIPLIER —The level control and multiplier in the AF Channel are used in conjunction with the indicator Magic Eye and can be employed to ascertain values of a-f voltage and also to compare the relative strength of two a-f voltages. . . . Once more the eye is a reference indicator. The sensitivity of the AF Channel is approximately .15 volt.

To determine the audio voltage at the probe tip (the green cable), the level control and multiplier are manipulated until the "eye" just closes. This is the reference setting of the a-f Magic Eye. Then the level control and multiplier readings indicate the value of this audio voltage within 15 or 20 percent.

If the multiplier is at "1," the audio voltage at the probe tip (the green cable) when the "eye" is just closed is equal to the number indicated by the position of the Level Control knob times 1.5. . . . If the multiplier is at '100," then the audio voltage at the a-f probe is equal to the setting of the Level Control required just to close the Magic Eye multiplied by 150.

As a means of establishing the difference between two audio voltage levels, the Magic Eye is used as the reference indicator and the two voltage values are established. The ratio between the two values is the gain or loss, depending upon the indications.

For example, if one voltage requires that the multiplier be at "1" and the voltage indicated by the level control setting is .5 and the second voltage requires that the multiplier be at "100" and the level control is at .2, then the two respective voltages are .5 for the first and 100 x .2 or 20 volts for the second and the gain is 20/.5 or 40 times.

The audio voltage calibrations apply to constant audio voltages from 150 to 50,000 cycles. The calibrations indicated upon the level control and multiplier are within 15 to 20 percent accurate. These voltages calibrations do not apply to 25 to 60 cycle a-c line voltage or to hum voltages.

This sacrifice of voltage calibrations at these low frequencies is deliberate in order to be able to distinguish hum voltages from the normal modulating voltages.

The control grid circuit of the amplifier tube is isolated from external d-c voltages, which means that the AF Channel can be used to check an audio signal any place in a radio receiving system or in an audio system where such an audio signal may exist.

The blocking condenser C29 enables application of the channel to points which carry d-c voltages not exceeding 1,000 volts. The high impedance input enables application of the AF Channel to grid as well as plate circuits in audio systems *without* loading the systems and *without interfering* with the normal operation of the amplifier system. The input impedance of the audio channel is about 2,000,000 ohms.

HOW THE AF CHANNEL IS USED—

1. *As an independent single-stage, high-gain amplifier* having flat response over the high-fidelity audio range. (The output of the RF-IF Channel can be amplified by the AF Channel.)

2. *As an independent single-stage, high-gain voltage amplifier* coupling two separate audio amplifiers, or an amplifier and another audio device.

3. *As a means of checking different audio voltage levels,* in different units or the same unit.

4. *As a means of listening to or visually observing an audio signal* present at any point in an audio system, at places where the signal is supposed to be present and at points where the signal is not supposed to be present. For visual observation an oscillograph is necessary.

5. *As a means of checking the presence of hum* by listening or by approximating the level.

6. *As a means of checking noise* in audio systems.

THE ELECTRONIC VOLTMETER

This device is unique in every respect and like the other Channels in the Chanalyst, has no counterpart in the servicing industry. Although a single instrument, we identify it as the Voltmeter Channel because of the many functions it performs.

Unlike the other Channels, the Electronic Voltmeter does not use an electron-ray indicator tube (Magic Eye) ; instead it employs an amplifier tube utilized as a d-c vacuum-tube amplifier. Therefore, it is vacuum-tube voltmeter of the d-c variety and is not suitable for a-c voltage measurements.

The layout of the equipment and controls upon the panel is shown in Figure 5. The "METER

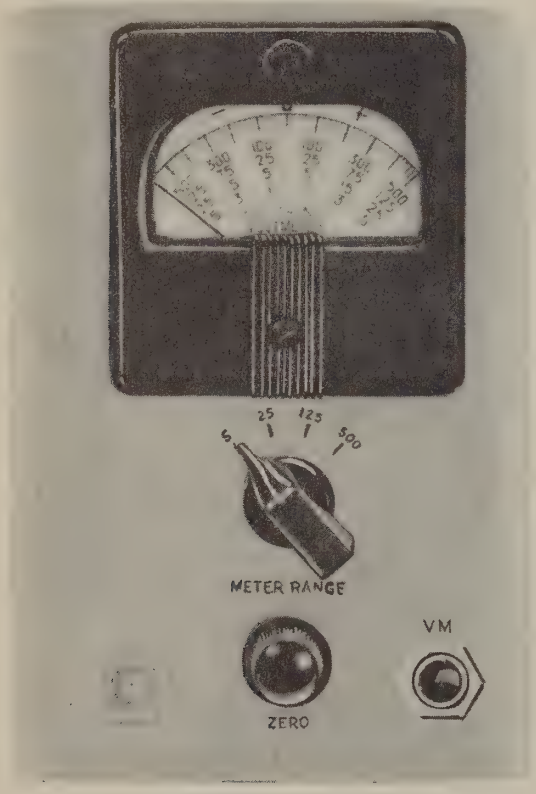


Figure 5

RANGE," "ZERO" Adjuster and the input jack are identified upon the schematic wiring diagram in Figure 1. The schematic also shows the wiring diagram of the pick-up probe and cable.

The Electronic Voltmeter will read both positive and negative voltages without any switching of leads or connections. In other words, one-half of the total scale is devoted to d-c voltages that are negative with respect to the common lead, which may be connected any place in the receiver or amplifier being checked, and the other half of the total scale is devoted to d-c voltages that are positive with respect to this free common lead. The meter is calibrated in four ranges:

−5 volts to 0 to +5 volts.
−25 volts to 0 to +25 volts.
−125 volts to 0 to +125 volts.
−500 volts to 0 to +500 volts.

All voltages ranges are available with a constant input impedance of approximately 10,000,000 ohms.

Special design features enable the Electronic Voltmeter to measure *any d-c voltage,* either operating or control, ANYWHERE IN THE SYSTEM WITHOUT INTERFERING WITH THE OPERATION OF THE RECEIVER OR AMPLIFIER AND WHILE THE SIGNAL IS PRESENT IN THE CIRCUIT. Furthermore, this voltage may be EITHER POSITIVE OR NEGATIVE with respect to ground or any selected point in the system being checked.

As a result of its extremely high input impedance, high resistances which so greatly hamper the average high-resistance voltmeter have little if any effect upon the indications obtained with the Electronic Voltmeter. The d-c voltage present in any point in the radio receiver, amplifier or device being checked can be established by simply placing the Electronic Voltmeter probe tip in contact with that point.

A brief resume of the general tests that can be made with the Electronic Voltmeter is as follows:

1. *Measure any d-c voltage* between 0 and 500 volts, plus or minus with respect to any common point.

2. *Measure rectified voltages* between 0 and 500 volts plus or minus, at the place where rectification takes place without interfering with the operation of the circuit.

3. *Measure d-c voltages at the control grid,* screen grid, cathode and plate terminals of oscillating, rectifying or amplifying vacuum tubes without interfering with the function of the tubes, with the signal present in the tube circuits.

4. *Measure leakage voltages* through various radio devices.

5. *Measure very low values of voltage* developed by sources which do not permit current drain in excess of 1 or 2 microamperes, such as bias cells or any other type of battery.

The tremendous range of operation and the speed with which all kinds of d-c voltages in a system can be checked will surprise you when you work with the Chanalyst. In the five general applications given above all the individual tests listed in a subsequent chapter are embraced.

THE WATTAGE INDICATOR CHANNEL

The Wattage Indicator Channel indicates the wattage consumption of the radio receiver, amplifier, or device being tested. It is operative upon a-c and ac-dc devices. On a-c devices, it is based upon an 80 percent power factor, which is the power factor of the power transformer under load as used in the average radio receiver.

Figure 6

Referring to the schematic wiring diagram in Figure 1, the wattage indicator as well as the complete Chanalyst power supply circuit is shown.

The wattage indicator circuit consists of a current transformer, diode rectifier and a Magic Eye. The power circuit of the device under test is placed in series with the current transformer by means of the wattage indicator receptacle located at the rear of the Chanalyst chassis, and marked "TEST WATTS." The reference indicator Magic Eye is shown in Figure 6, and adjacent and to the left of this eye is the "WATTS" indicator level control. This control is calibrated in watts with respect to zero shadow angle upon the Magic Eye, that is, with the eye just closed. The power consumed by the device under test, assuming it to be an a-c device, then is indicated by the setting of the "WATTS" control when the eye just closes. This is the actual power consumption within about 10 percent, which is normal tolerance. The range of indications is from 25 to 250 watts. When checking devices of unity power factor, the power consumption indications are multiplied by 1.25.

The idea behind the use of the wattage indicator is that it provides an extremely rapid method of establishing power supply, short circuits and other conditions which prohibit further voltage or signal tests. When made simultaneously with a d-c voltage test, as outlined later in this text, it furnishes positive identification of the type of trouble in a "dead" receiver or amplifier or one with reduced sensitivity. The power consumption can be compared with data furnished in service notes for the respective unit. The power consumption test supplemented by the simultaneous d-c voltage test will show "opens" as well as "shorts" upon "B" supply circuits, as well as subnormal or supernormal loads upon the power supply due to discrepancies in the various tube circuits. All this can be done instantaneously and without endangering the components in the device by prolonged exposure to overloads or extremely high voltages.

GENERAL SUMMARY

The foregoing paragraphs comprise a general description of the RCA-Rider Chanalyst and describe in brief the elements comprising the various channels, the location of the respective controls on the panel and afford a general idea of what these channels will do.

All the circuits employ a single free return or "ground" which, however, is not a ground in the ordinary sense of the term. It may be connected to the chassis for signal checking or to a cathode for voltage measurement. If the return for the voltage points is the chassis, it remains at that point for all measurements. It is a "free" ground, in other words, it may be connected to whatever point is the return circuit for signal or d-c voltage measurement.

Furthermore, this ground, it is not connected to the primary circuit other than through the filter network C25-C26, hence the Chanalyst may be used with all receivers, provided that a-c power is available to operate the Chanalyst. The manner in which this "free" ground is used will be evident from the various descriptions of the application of the Chanalyst.

HOW TO USE THE RF-IF CHANNEL

The best way to learn to use the RCA-Rider Chanalyst is to work with each channel individually. It will be surprising how little time will be required to learn how each section of the Chanalyst operates and how each control performs its function. A good place to start is with the RF-IF Channel and a simple way is to employ the RF-IF Channel as a conventional radio receiver. Further and more elaborate tests of this character follow later in this text.

THE RF-IF CHANNEL AS A RECEIVER—To use the Chanalyst as a receiver:

1. Plug the power cable plug into a convenient a-c receptacle.

2. Turn the "ON-OFF" power switch to "ON" and wait about one-half minute. When the Chanalyst is ready for operation, the four Magic Eyes will glow and the voltmeter pointer will indicate near the center O.

3. Set the rf-if "MULTIPLIER" and "LEVEL" control to "1."

4. Plug a pair of high-impedance phones, such as the crystal type, into the "RF-IF" output jack accessible at the rear of the cabinet.

5. The antenna can be the RF-IF (red) pick-up cable plugged into the RF-IF input jack. If still further pick-up is desired, the metal tip of this probe can be connected to any convenient antenna.

6. Now set the "RF-IF BAND SWITCH" to the proper frequency range as indicated upon the dial and the frequency of the station to be tuned in. Bear in mind that the frequency limits are 95 kc to 1700 kc.

7. Tune the Chanalyst so that maximum response is obtained in the headset and maximum indication is shown upon the RF-IF Magic Eye.

This is all there is to the tuning of the RF-IF Channel to any one signal frequency. However, there remain a few interesting points of discussion and further reading is necessary.

More than likely the eye will overlap when the station is tuned in, so that it may be difficult to tune accurately to the frequency of the station. To simplify tuning, all that is necessary is to reduce the sensitivity of the amplifier, by advancing the "LEVEL" control and returning the channel. Correct resonance will be found when the eye indicates minimum shadow without overlap. As a matter of fact, using the RF-IF Channel as a receiver affords an excellent means of learning the action of the Multiplier and Level Control in connection with signal strength comparison.

STATION SIGNAL STRENGTH COMPARISON—Suppose that one station is tuned in and in order just to close the eye at correct resonance, the "MULTIPLIER" switch is at "1" and the "LEVEL" control is at "2." While it is true that the signal heard in the phones is louder when the Magic Eye is overlapped than when it is just closed, it is preferable to operate with the eye not overlapped because it assures freedom from overload and consequent distortion.

The fact that all signals heard in the phones sound alike in intensity when the channel is set for the eye just to close, does not interfere with determining the relative strength of the signals at the cable tip, or for that matter, at the input of the channel. The settings of the "MULTIPLIER" and "LEVEL" controls for the same indication upon the eye establishes the relative strength of two signals.

For example, the settings of the "MULTIPLIER" and "LEVEL" control for one station 'A" have been stated. Now another station "B" is tuned in and the eye overlaps. At correct adjustment, the eye just closed, the "MULTIPLIER" is set at 10 and the "LEVEL" control at 4.5. The product of these settings is 10 x 4.5 or 45 for the "B" station and 1 x 2 or 2 for station "A." The ratio between these two is 45/2 or 22.5, so that the signal voltage pick-up from the second station is about 22.5 times greater than the first. Another station, say "C," is tuned in and at correct adjustment with the eye just closed, the settings are "MULTIPLIER" at "1" and "LEVEL" control at "8." Thus, the signal voltage from station "C" is about four times as great as that from station "A" and is about one-sixth of that from station "B," that is, at the point of reception and with the antenna used.

In making the comparisons above, we assume that the response of the band over which the foregoing tests were made, is flat over the range. The maximum deviation that takes place in the Chanalyst is about 2:1 over the middle portion of any rf-if band, with respect to the two limits of that band, so that for ordinary comparison, this variation in internal gain is sufficiently small to justify the statement that the amplifier is substantially flat.

For further experimenting you can select a broadcast station which overlaps the eye when the "MULTIPLIER" and "LEVEL" control are set at "1" and the "Magic Eye" can be partly opened when the "LEVEL" control is advanced to "10." Note the indication upon the eye when the "MULTIPLIER" and "LEVEL" control are set at "1" and when the "LEVEL" control is advanced to "10." Now reset the "LEVEL" control to "1" and increase the "MULTIPLIER" setting from "1" to "10." Note that the indication upon the eye is approximately the same as when the "MULTIPLIER" is at "1" and the "LEVEL" control is at "10." This correct relation between the "MULTIPLIER" and "LEVEL" controls prevails when the pick-up cable connected to the input of the RF-IF Channel is the rf-if cable (red cable).

It is also interesting, during such receiver experiments or tests, to note the effect of noise upon the Magic Eye. If external noise is present, note the manner in which the "Magic Eye" flickers in accordance with the noise heard in the phones; how the two occur simultaneously. Note how easily it is possible to check a noisy carrier. When checking noise, THE MAGIC EYE SHOULD NOT BE CLOSED OR OVERLAPPED.

THE RF-IF PLUS THE AF CHANNEL AS A RECEIVER—It is possible to use the AF Channel in conjunction with the RF-IF Channel for normal radio reception. To add the channel, operate the Chanalyst as outlined with the following additions:

1. Remove the headphone plug from the RF-IF output jack (rear of cabinet) and insert the plug into the AF Channel output jack (rear of cabinet).

2. Arrange a shielded conductor terminating at both ends in conventional phone plugs, such as are used for the various probe cables. The conductor cable should be connected to the tips of these two plugs. The shield braid should be connected to the sleeves of the two plugs.

3. Insert one plug into the RF-IF output jack (rear of cabinet) and the other plug into the AF Channel input jack (on front panel).

4. Operate the AF Channel level control like the conventional volume control. The AF multiplier should be set at "1."

THE RF-IF CHANNEL FOR ZERO BEAT INDICATION—The RF-IF Channel can be used as a heterodyne detector and zero beat indicator over the frequency range of 95 kc to 1700 kc. The connections are shown in Figure 7.

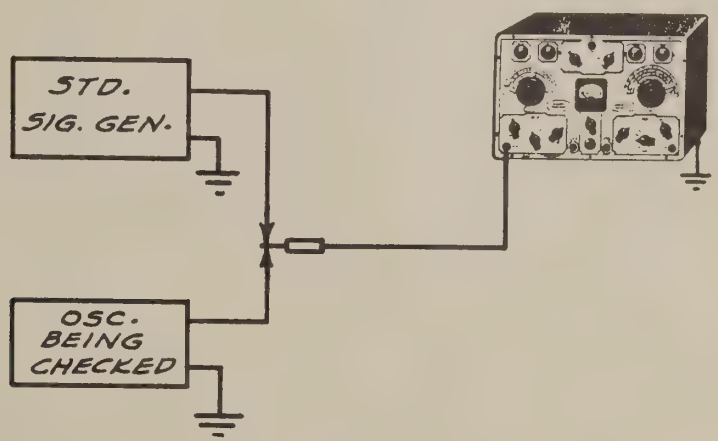


Figure 7

1. Place the Chanalyst in operation.

2. Feed the standard signal into the RF-IF Channel. If 500 microvolts or more of signal is available, you may use the regular rf-if (red) cable, otherwise, use the a-f (green) cable.

3. Tune the Chanalyst to correct resonance with this signal, with the "MULTIPLIER" and "LEVEL" controls set at "1."

4. Adjust the test signal output so that the RF-IF Channel Magic Eye is about half closed. Plug the voltmeter into the RF-IF pin jack, adjacent to the rf-if probe cable jack, by means of the regular voltmeter (blue) cable. The voltmeter cable plug is inserted into the voltmeter input jack and the tip of this cable probe is plugged into the "RF-IF" pin jack. Use the 5-volt range and adjust the input signal so that the voltmeter will indicate about 3 volts. This voltage will be indicated when the eye is about half closed.

5. Now feed the second signal which is to be brought to zero beat with the first to the Chanalyst by connecting the output of this signal source to the metal tip of the probe cable being used as the rf-if input.

6. Adjust the level of the second signal to about half the strength of the first.

7. Now tune the second signal source accurately. As zero beat is being approached, the eye shadow will vary in accordance with the beat frequency and the meter point will likewise swing in accordance with the beat. The eye shadow and the meter pointer will cease varying or moving at zero beat. The accuracy with which the Chanalyst is tuned to the two signals is not very important, because the function of the Chanalyst in this case is that of a visual zero beat indicator. Adjustment can be made to exact zero beat or to a very small fraction of a cycle. Naturally, the higher the two signal frequencies, the more critical will be the tuning the signal sources, not the Chanalyst. Once the Chanalyst has been brought to approximate resonance with the standard signal, no further tuning adjustment is required unless the standard frequency is changed.

THE RF-IF CHANNEL FOR CHECKING ANTENNA PICK-UP—Use the RF-IF Channel, as a receiver with the following additions (refer to Figure 8):

1. Adjust the voltmeter "METER RANGE" switch to the 5-volt range.
2. Adjust the "ZERO" adjusting knob so that the voltmeter pointer is at the center "0."
3. Insert the Voltmeter (blue) cable plug into the Voltmeter ("VM") input jack.
4. Insert the metal tip of the Voltmeter (blue) cable probe into the pin jack adjacent to the "RF-IF" input jack. (Without any signal input into the Chanalyst, the voltmeter will indicate between .5 to 1.0 volt. This is normal and is the contact potential developed in the diode.)

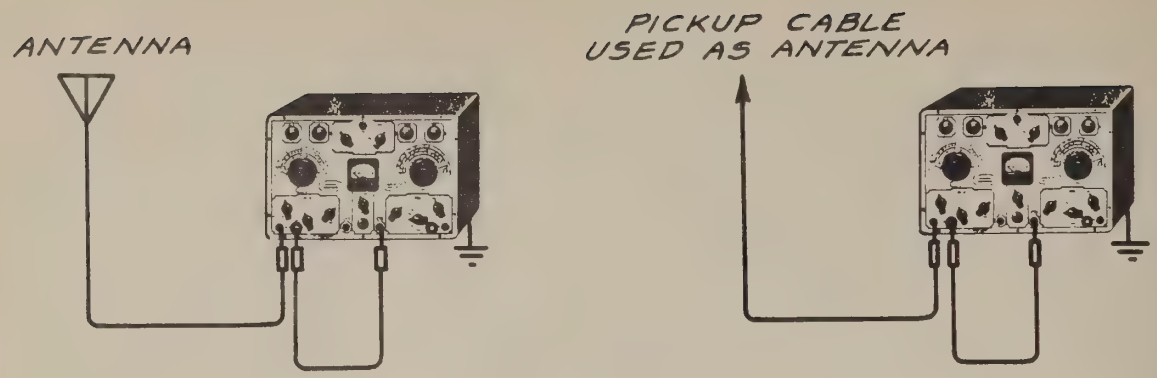


Figure 8

5. Connect the antenna to the "RF-IF" input jack by means of a phone plug or the a-f (green) cable. Set the "MULTIPLIER" and "LEVEL" controls to "1."
6. Tune the Chanalyst to resonance with the broadcast station. Note the voltage indication upon the voltmeter. On an average, every 12 microvolts of signal will cause a deflection of one volt. This may vary about 25 percent.

Based upon the above figures, full scale deflection (5 volts), upon the 5-volt scale means a signal of about 60 microvolts. Using the "LEVEL" control over its entire range increases the signal input range 10 times, so that a 5-volt indication upon the 5-volt scale and the "LEVEL" control at "10" means a signal input of 3 millivolts. Using the 125-volts. Using the 25-volt scale of the volt meter increases the range of signal voltage measurement by 5 times, so that a 25-volt indication upon the 25-volt scale and the "LEVEL" control at "10" means a signal input of 3 millivolts. Using the 100-volt scale increases the range of signal voltage measurement another 5 times, so that the final range of signal voltage measurement is from about 5 microvolts to about 15 millivolts.

At signal levels in excess of 10 millivolts, the rf-if cable (red) should be used as a connecting link between the antenna and the input of the RF-IF Channel. This cable has an attenuation of 100 times, so that with this cable in the circuit, the range of signal measurement is increased to several volts. It is best when making such tests to use the 25-volt scale whenever possible because this scale reduces the effect of the diode contact potential.

It may be pointed out here that the Chanalyst may be used to great advantage in checking automobile antennas.

THE RF-IF CHANNEL FOR CHECKING NOISE PICK-UP BY THE ANTENNA—To check noise pick-up by the antenna, use as for checking antenna pick-up with the noise as the signal. To check the entry of noise into the receiver via the aerial, connect the aerial to the Chanalyst and tune to the desired station or listen for noise. If the noise is picked up by the antenna, it will be possible to attenuate the noise by means of the rf-if "MULTIPLIER." If this control when advanced does not attentuate the noise, then the noise is not being picked up by the antenna.

THE RF-IF CHANNEL FOR ANTENAPLEX CHECKING—The RF-IF Channel as a receiver may be used effectively for checking antenaplex systems, including the distribution line and outlets. Proceed as for checking antenna pick-up. Check the antenna at the Antensifier input, then check at the Antensifier output and at various outlets of the distribution line.

THE RF-IF CHANNEL FOR CHECKING AC POWER PICK-UP—Use the RF-IF Channel as a receiver. Make contact to the "high" side of the "AC" power line with the RF-IF (red cable) probe, and listen for pick-up or noise. The Electron Voltmeter may be plugged in and used as an indicator, as described under the RF-IF Channel for Checking Antenna Pick-up.

THE RF-IF CHANNEL FOR CHECKING WIRELESS RECORD PLAYERS—Use the RF-IF Channel as a receiver. Place the rf-if (red cable) probe near the wireless record player and tune Chanalyst to the desired frequency. Then adjust the trimmer on the wireless record player for maximum output at this frequency as indicated on the "RF-IF" Magic Eye.

THE RF-IF CHANNEL FOR CHECKING CARRIER-TYPE "WIRELESS" INTER-OFFICE CALL SYSTEMS—Use the RF-IF Channel as a receiver. Make contact to one side of the power line with the RF-IF (red cable) probe, and tune the Chanalyst to the desired carrier frequency. Adjust the trimmers on the call system units for correct frequency and maximum output as indicated on the RF-IF Magic Eye.

THE RF-IF CHANNEL FOR SIGNAL TRACING—Having discussed the RF-IF Channel as a radio receiver, let us now consider its application to tracing a signal through the r-f and i-f circuits of a radio receiver. The primary purpose of this

discussion is to show how the RF-IF Channel enables us to localize defects in the radio frequency, intermediate frequency or oscillator circuits of the receiver under test. Troubles in the remaining circuits of the receiver are revealed by further tracing with other channels of the Chanalyst.

Refer to the receiver schematic diagram Figure 9. Reference to various points upon this diagram apply to equivalent points in a conventional a-c superheterodyne receiver employing an r-f stage, a combination mixer-oscillator, one i-f stage and a dual-function second detector and a.v.c. diode. This receiver normally operates over the standard

2. Insert the rf-if (red) cable plug into the "RF-IF" input jack and set the "MULTIPLIER" and "LEVEL" control knobs to "1." Then adjust the "RF-IF BAND SWITCH" to Band "B." Connect the Chanalyst ground clip to the receiver chassis.

3. Place the rf-if (red cable) probe point in contact with the antenna terminal "1" in Figure 9.

4. With the probe on "1," adjust the test oscillator output so that a strong signal is fed into the receiver. Now tune the RF-IF Channel to resonance with this signal. If the channel eye overlaps, reduce the test oscillator output until the eye just

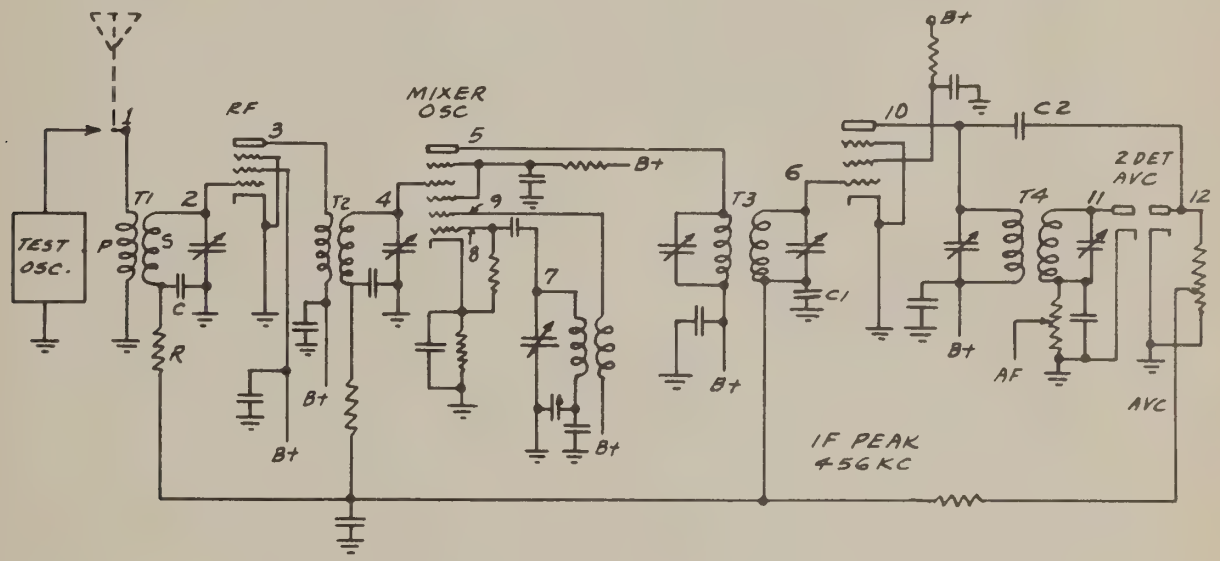


Figure 9

broadcast band, from 540 kc to 1700 kc. Variations of this circuit embracing multi-wave-bands, automatic frequency control, t-r-f systems, triple-tuned transformer circuits, ac-dc operation, etc., will be discussed later.

For signal-tracing purposes, we should preferably use a test oscillator, capable of producing a modulated signal at some frequency in the vicinity of 600 kc. The precise frequency is not important; we wish merely to select for our tests some point in the low-frequency region of the standard broadcast band. Remembering that our RF-IF Channel is also a radio receiver, we shall choose a spot in the broacast band where no strong local station is operating, in order to avoid interference from the broadcast station while making our tests.

Assuming that 600 kc meets the above requirements, we adjust our test oscillator to supply a modulated signal of this frequency and connect it to the antenna and ground terminals of the receiver we are testing. To trace this signal through r-f and i-f circuits of the receiver, we proceed as follows:

1. Place the Chanalyst in operation.

closes. This is an ideal initial reference setting, but since a few test oscillators have insufficient output to close the eye, for the purposes of this discussion, we adjust the output until the eye is about one-half closed. Note this shadow area carefully; this is our initial reference setting and will have to be duplicated.

(Instructions given later in the text show how the Electronic Voltmeter may be used as a reference indicator; the initial indication can then be repeated without difficulty, even with much lower signal input level.)

With this original reference indication established, we can check through the receiver and measure the gain or loss in signal strength at any point in the sections being tested. If the probe is moved to a point where the signal is much stronger, the eye will overlap; if the signal is weaker at such a point, the eye will open. By manipulating the "MULTIPLIER" and "LEVEL" controls, we can tell how much stronger or weaker the signal becomes as we trace it from point to point in the receiver circuits. With this information, we can determine whether or not each circuit is functioning properly.

To check the signal through the antenna transformer—We move the probe from "1" to "2," the control grid of the r-f tube. This is also the stator of the r-f section of the tuning condenser gang. Be sure that the probe point makes good electrical contact.

Normally, this antenna transformer provides an increase in signal voltage, hence we examine the indicator Magic Eye. If the increase is indicated, we check this gain in signal voltage.

To check the signal gain in the antenna transformer—With the probe tip in contact with "2," we advance the "LEVEL" control until the original channel eye reference indication is duplicated. Let us assume that, in order to restore this indication, the "LEVEL" control must be advanced to 2.5. This means that the signal gain in the antenna transformer is 2.5. (Facts relative to gain to be expected in different parts of the receiver are discussed in detail elsewhere in this instruction book.) For the moment, let us assume that this gain is normal.

Suppose that a loss or insufficient gain is indicated—When the probe is moved from "1" to "2" and the eye opens instead of closing. What conditions will cause such an indication? Improper tracking between the r-f section of the condenser gang and the remainder of the gang is one condition. Another is an open antenna coil. A short to ground across the antenna coil will not cause this effect because it will prevent any initial indication when the probe is at "1." However, the absence of a ground to the frame of the condenser, or an imperfect blocking condenser, C, may cause a loss. Shorted turns in the secondary winding or a leak across the grid and cathode of the r-f tube or socket will also cause such a condition.

If a loss is indicated in such a two-winding transformer, the normal routine is to apply other tests to check the conditions mentioned. No further signal-tracing should be done until the trouble localized in any one circuit of the receiver is cleared.

The test for tracking or alignment is given in the section devoted to "ALIGNMENT." (Incidentally, poor tracking at 600 kc is a commonplace condition, even when some gain is indicated.)

With normal signal at "2," we have a choice of checking the signal at the plate "3" of the r-f tube or advancing to the control grid of the mixer, "4." The latter is the usual move because it embraces the complete stage, whereas working between "2" and "3" covers the tube only.

To check the signal transfer from r-f grid to mixer grid—Move the probe tip to the control grid of the mixer tube "4" or to the stator of the mixer section of the tuning condenser gang. This point is joined to the mixer control grid. The Chanalyst tuning need not be changed because we are working with the original 600 kc signal. The same is true of the receiver tuning. We should find an increase in signal voltage and the eye should close or overlap.

To check the increase in signal voltage between points "2" and "4"—The "LEVEL" control is advanced. If turning the "LEVEL" control to 10 is not enough to restore the original reference indication upon the eye, the "MULTIPLIER" is brought into use. For example, let us assume that the original reference indication appears when the "MULTIPLIER" is set to 10 and the "LEVEL" control is advanced to "3." This means that the total gain from antenna "1" to mixer grid "4" is 10 x 3 or 30. You recall that the gain between antenna and r-f grid was 2.5, so that the gain between the r-f grid and the mixer grid is 30/2.5 or 12.

The signal gain noted between the r-f grid and the mixer grid takes place with the a.v.c. acting, hence this is not the maximum gain available in the system. While the a.v.c. action does not influence the antenna transformer gain, it does affect the r-f tube amplification. To establish the maximum gain without a.v.c. action, all that is necessary is to remove temporarily the a.v.c. diode from its tube socket and repeat the gain measurements. Removing this tube may interfere with the signal beyond the second detector, but that is not important when working in the r-f or i-f portions of the receiver. The gain is checked with the a.v.c. diode out of the socket and found to be 60 between antenna and mixer grid and 24 between r-f grid and mixer grid.

To check for a loss in signal between points "2" and "4"—Move the probe from "4," to the nearest preceding point where a signal should exist. This is "3," the plate of the r-f tube. Observe the indication upon the eye.

If a signal of reasonable intensity is indicated, then it is evident that the trouble is somewhere around the secondary circuit of the transformer which feeds the mixer tube. Defects are tracking, open secondary, shorted secondary winding, poor ground, open blocking condenser, open lead from condenser stator to grid, etc. Operating voltages applied to the mixer tube do not in any way influence the signal across the grid-ground circuit, unless the grid becomes positive and grid current flows through the coil. A leak between grid and cathode in the tube or the socket will tend to load the tuned circuit and thus cause a reduction in signal. As you can see, these possible troubles are very much like those listed in connection with the r-f grid circuit.

It might be well to state that the coupling transformer itself contributes little to the total gain. It does contribute a great deal in connection with the r-f tube, but not by itself. The presence of a normal signal at the plate of the r-f tube, "3" immediately eliminates the primary winding as the cause of the trouble.

Suppose that a signal does not exist at "3," the plate of the r-f tube—We know that a signal exists at the r-f grid. With no signal or insufficient signal at the plate of the same tube, it stands to reason that some operating condition within this cir-

cuit is not being fulfilled. Perhaps it may be due to some condition remotely generated, but the effect must be evident at some point in the tube circuit. Testing this tube circuit, then points the way to the cause.

The Electronic Voltmeter is used to check the various tube operating potentials, inclusive of the control grid bias, right at the control grid of the tube. (The manner in which the Electronic Voltmeter is used to check tube operating potentials is described in the operating notes covering the channel.)

With normal signal at the r-f grid, we advance to the next point of test and this is the mixer plate, "5," as shown in Figure 9. This is a very important place in the receiver because valuable information can be obtained here. Three major signals of three different frequencies are available at this point; the r-f signal, the i-f signal, and the signal produced by the local oscillator within the receiver. Not only is the presence of these signals important, but the frequency of the i-f and the oscillator signal are also very important.

To check the r-f signal at "5," the mixer plate—Move the probe from the mixer grid to the mixer plate. The matter of gain at the radio frequency is not important. As a matter of fact, a loss between "4" and "5" will generally be obtained. However, it is essential to know that the r-f signal is present at "5," to make certain that the absence of an i-f signal at "5" is not due to the absence of the r-f signal input.

There is also another function of "5" with respect to the original r-f signal; in connection with alignment. The mixer plate is the location of the rf-if probe during the alignment of the r-f and mixer tuning condensers. The need for rocking, while adjusting the oscillator padding condenser is eliminated and perfect tracking at this point is assured. This operation is described under "ALIGNMENT."

To check the i-f signal at "5" the mixer plate—With the probe at "5," tune the Chanalyst to resonance with the i-f signal. For accurate tuning, it will be necessary to manipulate the "MULTIPLIER" and "LEVEL" control knobs, so that the eye does not overlap.

Now read the frequency calibration indicated upon the dial. It should correspond with the intermediate frequency upon the schematic, namely 456 kc. As is evident, the i-f test at "5" provides the extremely valuable information about the i-f peak, for what is supposed to be correct tuning of the receiver in accordance with the dial setting. Thus, with one operation we have identified the following important facts:

a. Dial tracking
b. The i-f peak
c. Oscillator tracking
d. Oscillator frequency

If the i-f peak and the dial setting are correct, the next step is to check the i-f signal at "6," the control grid of the i-f tube. This test between the mixer grid and the i-f control grid is the "conversion gain," although as far as we are concerned in this signal tracing process, it establishes a gain in signal between "4" and "6."

As you can see, we have not checked the oscillator. If the i-f peak is correct and if the receiver dial is set at 600 kc, when we are listening to a 600-kc signal, it stands to reason that the oscillator frequency is correct. It does not mean that the level of the oscillator voltage is correct. This will not be established until we check the signal at the i-f control grid, but in the meantime, it is unnecessary to check the oscillator.

To check the i-f signal at "6," the i-f control grid—The probe is moved from "5" to "6" and with the Chanalyst already tuned to the intermediate frequency, the "MULTIPLIER" and "LEVEL" controls are adjusted to produce the original reference indication upon the eye. Examining the calibrations indicated by these knobs, we find that the total gain between antenna "1" and "6" the i-f control grid, is 300.

The gain up to the mixer grid was 30, as established in checking signal voltage between points "2" and "4," so that the conversion gain or the gain between the mixer grid and the i-f tube control grid is 300/30 or 10.

Assuming that the i-f signal at "5" is of the wrong frequency—Let us retrace some of our steps back to "5," the mixer plate. When tuning to the i-f signal, we do not find it at the expected point on the frequency scale. It may be 10, 20 or even 50 kilocycles higher or lower than the correct frequency of 456 kc. If the receiver dial is examined and found set at the 600-kc point, the frequency of the signal at the antenna, we immediately know that the oscillator in the receiver is generating a signal which is higher or lower than the correct frequency by the amount that the i-f signal at the mixer plate differs from the correct value.

This variation may or may not interfere with the passage of the signal through the receiver, depending upon the amount of discrepancy and also whether or not the i-f transformers are attuned to the frequency present at the mixer. At any rate, realignment at the correct frequency is needed, even if what appears to be normal gain exists at the i-f control grid, as described under "To check the i-f signal at '6,' the i-f control grid." The manufacturer's stated intermediate frequency should be the operating frequency.

However, it is possible that this discrepancy as noted at the mixer plate is the reason why there is no signal output from the receiver. This can be checked instantly by looking for the signal at what appears to be the wrong i-f peak at "6," the i-f control grid. If the i-f transformers are correctly tuned to the manufacturer's rated i-f peak,

no signal will be at "6," the i-f tube control grid. Then it becomes necessary to check the oscillator signal.

To check the oscillator signal—The RF-IF Channel can be used if the oscillator signal frequency is within its range. The Oscillator Channel is provided for this purpose (and some others), but since we are working with the RF-IF Channel, it is convenient to use it. The "RF-IF BAND SWITCH" is changed to Band "C." The probe is still at "5," the mixer plate, and we tune in the set oscillator signal. The "MULTIPLIER" and "LEVEL" controls are varied so as to allow accurate tuning. We now check the calibration indicated and establish the frequency of the signal developed by the receiver oscillator.

The next step is to examine the receiver dial setting. If it is correctly set at the 600-kc point, then we know that the oscillator alignment is correct. If, however, the receiver dial is not correctly set to 600-kc, which is the frequency being received, dial tracking and realignment of the oscillator are in order.

A major discrepancy may exist in i-f peak at the mixer plate—In which case it will be necessary to hunt for this i-f signal and it may be found several hundred kilocycles away from the correct value. This indicates incorrect operation of the oscillator, which can be checked as outlined and also those components which determine frequency; padder, trimmer, coil, grounds, etc. Check also for short circuits and open circuits, inclusive, of the tube, although, generally speaking, shorts or opens in the tube circuit will cause it to stop oscillating, rather than change frequency.

The oscillator can be checked at points other than the mixer plate, as for example, at "7," the stator of the oscillator section of the tuning condenser; at "8" the oscillator control grid and at "9" the oscillator plate. A full discussion of such tets upon oscillators is given in the description of the Oscillator Channel and the facts contained there apply to the RF-IF Channel, when operating over the frequency range covered by the RF-IF Channel.

Suppose the i-f signal is absent at "5," the mixer plate—The first step is to establish if the r-f signal is present in the mixer. This is done as has been outlined. If present, the next step is to check the operating potentials applied to the mixer portion of the tube elements.

To check operating potentials—The voltmeter is adjusted to the proper range by means of the "METER RANGE" switch. The voltmeter cable (blue) plug is inserted into the "VM" (voltmeter) jack. Then the voltmeter probe tip is placed in contact with whatever tube element is to be checked. (For full details concerning the application of the voltmeter, see the chapter devoted to that subject.)

If voltage is not present at any of the tube elements, that circuit is traced to find why the voltage is absent. The voltmeter can be used to isolate the defect by checking at both ends of the various current-carrying components in the circuit.

If voltage is normal at the tube elements, we then check to establish if the oscillator tube is generating the heterodyning signal. Inasmuch as it is possible that the oscillator frequency differs so greatly from the correct frequency that the i-f signal developed is beyond the frequency range of the RF-IF Channel, the first test is to check operation without regard to frequency.

To check operation of the oscillator—We place the voltmeter (the blue cable) probe in contact with the oscillator control grid. The Voltmeter should be adjusted to the 25-volt range. If the oscillator tube is oscillating, a voltage will be developed across the oscillator grid leak. This voltage will make the control grid negative with respect to ground, and the voltage may vary from about 5 to possibly 30 volts. If the oscillator is not operating, the control grid will be at zero potential, or possibly a small voltage positive with respect to ground will be indicated. It depends entirely upon the return connection of the grid leak. In the schematic shown, the control grid would be positive when the oscillator portion of the pentagrid converter is not functioning.

If we find that the tube is oscillating, the next test is for frequency.

Suppose the i-f signal is weak at "5," the mixer plate—If the control grid bias applied to the control grid of the mixer is excessive, the gain in the mixer tube will be very low and this will influence the level of the i-f signal. This control grid bias can be checked with the voltmeter.

One other possible fault that might be mentioned is excessive oscillator voltage. If this condition exists it will materially reduce the gain available in the mixer tube during the conversion process, and the signal at the mixer plate will be considerably less than normal. As a matter of fact, excessive oscillator voltage may block the operation of the mixer tube. This oscillator voltage can be checked with the voltmeter across the oscillator grid and ground. A voltage in excess of 30 or 35 volts should be investigated, particularly when the operation of the mixer tube does not appear to be normal.

Suppose there is no signal at the point "6," the i-f control grid—Having found the correct signal at the mixer plate and since we lack a signal of normal strength at the subsequent i-f control grid, it stands to reasons that the trouble must be in the i-f transformer, T3.

Furthermore, the normal signal present at the mixer plate precludes a short circuit or an open circuit in the i-f transformer primary, hence the trouble is localized as being in the i-f transformer and can be due to misalignment of either the primary or secondary circuits, or both, defective trimmers, a defective secondary winding, etc.

It may be well to mention that one way of determining if the i-f transformer trimmers are operative is to keep the probe in contact with "6" and to vary the trimmers.

The i-f tube is coupled to the second detector diode plate "11" and, assuming normal signal at the i-f control grid, the next test is for the transfer of the i-f signal from "6" to "11." We can, if we wish, check the signal voltage at "10," the plate of the i-f tube, but we save time by advancing to the diode plate.

To check the signal at the diode plate "11"—The probe (red cable) is moved from "6" to "11." The Chanalyst is resonated to the i-f signal and the "MULTIPLIER" and "LEVEL" controls are adjusted so that the original reference indication appears upon the eye. This indication appears when the "MULTIPLIER" is at 1,000 and the "LEVEL" control is at 9.5, which means that the total gain between antenna and diode plate is 9500.

If you remember, the total gain up to the i-f control grid (operation 14) was 300. Therefore, the gain between the i-f control grid and the detector diode plate is 9500/300 or about 32.

It is possible that manipulation of the "MULTIPLIER" and "LEVEL" controls will not restore the indication upon the eye to the original reference value. In other words, the gain in the receiver from antenna to detector diode plate is in excess of 10,000. If you desire to establish the signal gain between the i-f control grid and the detector diode plate under such conditions, a new reference value is set at the i-f control grid, "6" and when the probe is moved to "11," the "MULTIPLIER" and "LEVEL" controls are adjusted to restore the indication upon the Magic Eye to the value established when the probe was at "6," the i-f tube control grid.

As a matter of information, the signal gain between the control grid of an i-f tube and the detector diode plate which that i-f tube feeds, is less than the gain between the i-f tube control grid and the plate of the same tube. In other words, a loss takes place between the plate of the i-f tube and the subsequent detector diode plate. The loss in this diode input transformer may vary from about 1.5 to 1 to about 3 to 1.

Suppose the i-f signal is missing at "11," the diode plate—The probe (red cable) would be moved from "11" to "10," the i-f tube plate. If a normal signal appeared at this point, it would localize the trouble as being in the i-f transformer, T4, and the associated circuits. If no signal is at "10," the i-f tube is not normal; then the tube operating voltages are checked, including the a.v.c. voltage applied to the control grid and the d-c continuity of the grid circuit of the i-f tube.

To check the loss in the diode input transformer—The (red cable) probe is placed in contact with "6," the i-f tube control grid, and a reference indication upon the eye is established. Then the signal gain between "6" and "11" is checked and also the total gain between "6" and "10." The ratio between the latter and the former is the loss in the coupling transformer. Suppose that between "6" and "11," the gain is 32 and between "6" and "10" the gain is 64. The ratio 64/32 or 2 is the loss in the transformer.

THE A.V.C. DIODE SIGNAL—If you examine the schematic in Figure 9, you will note that a condenser is connected between the plate of the second i-f tube and a diode plate (point "12"). This is the a.v.c. diode plate. In some instances, this diode is joined to the detector diode and the detector and a.v.c. functions are performed by the same diodes. In this case, however, individual diode plates are used.

In order that the a.v.c. function, it is necessary that this a.v.c. diode plate receive a signal voltage from the i-f tube and this signal voltage is transferred to the diode plate through the condenser C2.

To check the i-f signal at the a.v.c. diode plate—The (red cable) probe is moved to the a.v.c. diode plate, "12." Inasmuch as C2 usually is a small value capacity, it may be necessary to adjust the attenuators so as to increase the sensitivity of the RF-IF Channel in order to check this voltage. In this connection, the exact value of voltage upon the diode plate is not the paramount item. Of greatest significance is the test to establish if the i-f signal voltage is present at the a.v.c. diode plate in order to actuate this circuit, particularly when some defect appears to exist in the a.v.c. system.

USING HEADPHONES IN SIGNAL TRACING—Up to this time, we have not spoken of the use of headphones in connection with signal tracing. However, you no doubt remember references to the fact that a jack is provided in the output circuit of the RF-IF Channel and the purpose of this jack is to allow the use of headphones so that it is possible to listen to the modulated signal voltage existing at the point where the rf-if pick-up cable probe tip is in contact with the circuit under test.

Although this headphone arrangement is provided primarily for distortion checking when an oscillograph is not available, it is possible to trace the signal through a system by listening, just as well as by watching the Magic Eye.

With headphones plugged into the "RF-IF" output jack and the (red cable) probe moved through the various points outlined in connection with Figure 9, we can listen to this signal any place along the line where the modulated signal exists. The headphones required for this purpose are a pair of high impedance phones such as the crystal type.

It should be understood that the use of these phones does not in any way change the progress of signal tracing as previously outlined. The use of these phones in connection with signal tracing to locate the source of distortion is described under the heading of "DISTORTION TRACING,"

When listening to a signal any place in the r-f or i-f system, the signal heard is the rectified carrier voltage present at the place where the probe tip is in contact with the receiver. Naturally, the carrier must be modulated.

TUNED RADIO FREQUENCY RECEIVERS—Signal tracing in tuned radio frequency receivers does not differ from that explained in connection with the superheterodyne shown in Figure 9. Since frequency conversion does not take place in a t-r-f receiver, the signal checked between the antenna and the detector tube is of the frequency fed into the receiver at the antenna. In other words, the entire tuned radio frequency portion, inclusive of the detector, is treated exactly as the radio frequency portion of a superheterodyne.

SUPERHETERODYNES WITH A.F.C.—The presence of automatic frequency control in a superheterodyne does not complicate the process of signal tracing. Every superheterodyne equipped with a.f.c. becomes a conventional superheterodyne receiver when the a.f.c. switch is set to cut the a.f.c. system out of the circuit.

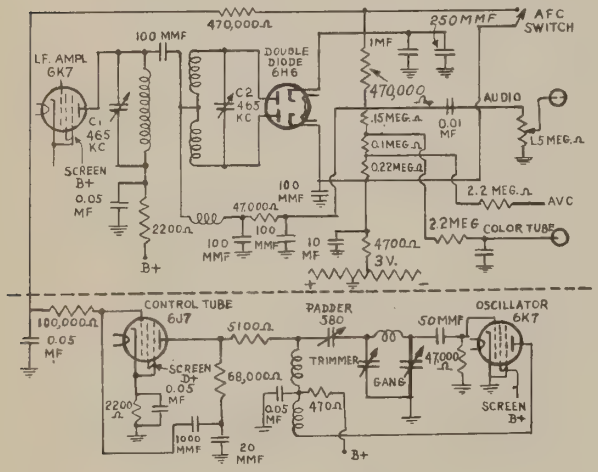


Figure 10

When the a.f.c. system is in the circuit, several additional points of test are added. For example, Figure 10 shows a conventional a.f.c. system. The complete superheterodyne circuit need not be shown.

Referring to the schematic, we note the plate circuit of the i-f tube, the discriminator transformer, the discriminator tube, which also serves as the source of a.v.c. and the rectified audio voltage, the control tube and the oscillator, which also is the mixer tube.

The oscillator signal at frequencies up to 1700 kc can be checked in the conventional manner as previously outlined. The frequency can be checked with the a.f.c. switch "ON" and 'OFF" in order to note the effect of the a.f.c. system. These signals also can be checked at the control tube grid and plate. At the higher frequencies, the arrangement shown in Figures 11 and 12 is used. The oscillator channel probe is placed near, but not in contact with the tuning condenser contact which joins the tuning condenser or trimmer to the control grid. Thus, all reaction at even the highest frequency within the range of the Chanalyst is avoided. The same is true when the control grid and plate contacts of the oscillator are accessible at the bottom of the tube socket. See Figure 11.

Application of the control grid bias, fixed, or variable as supplied from the discriminator tube is checked by means of the Electronic Voltmeter and this operation is described under that caption.

The i-f signal fed into the discriminator tube can be checked by alternately placing the (red cable) probe in contact with the two diode plates. The voltage fed to the discriminator transformer through the condenser can be checked by placing the probe with the lead that joins the condenser on the secondary side.

The output bias voltage developed by the discriminator tube and applied to the a.f.c. control tube can be checked by means of the Electronic Voltmeter and is discussed elsewhere in this instruction book.

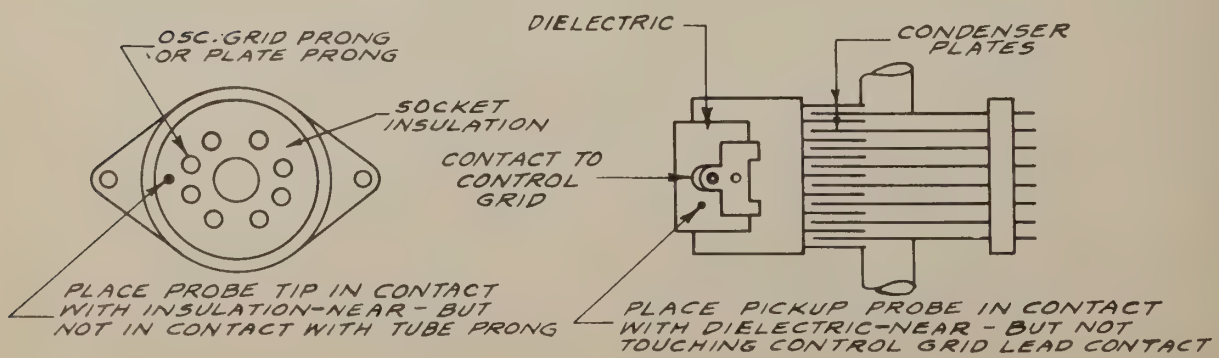

OSC. GRID PRONG OR PLATE PRONG
SOCKET INSULATION
CONTACT TO CONTROL GRID
PLACE PROBE TIP IN CONTACT WITH INSULATION-NEAR-BUT NOT IN CONTACT WITH TUBE PRONG

Figure 11

DIELECTRIC
CONDENSER PLATES
PLACE PICKUP PROBE IN CONTACT WITH DIELECTRIC-NEAR-BUT NOT TOUCHING CONTROL GRID LEAD CONTACT

Figure 12

Another type of a.f.c. system wherein a three winding i-f transformer is used with one winding feeding a separate a.f.c.-i-f amplifier tube is shown in Figure 13. These additions do not complicate matters. All they do is add several other points where the i-f signal is checked. One of these points is the high side of the tertiary (third) winding which feeds the control grid of the a.f.c.-i-f amplifier tube. The second point is the control grid of this tube and the third is the plate circuit of this amplifier tube.

The process of signal tracing does not change. This is shown in the accompanying block diagram. See Figure 14. Note that one portion of the receiver is variable tuned and that the remainder is fixed tuned. The process of signal tracing, exclusive of the a.f.c. circuit, which is covered separately is as follows:

1. The 650-kc signal is fed in at the antenna.

2. This signal, the oscillator signal in the variable tuned section and the i-f signal out of the

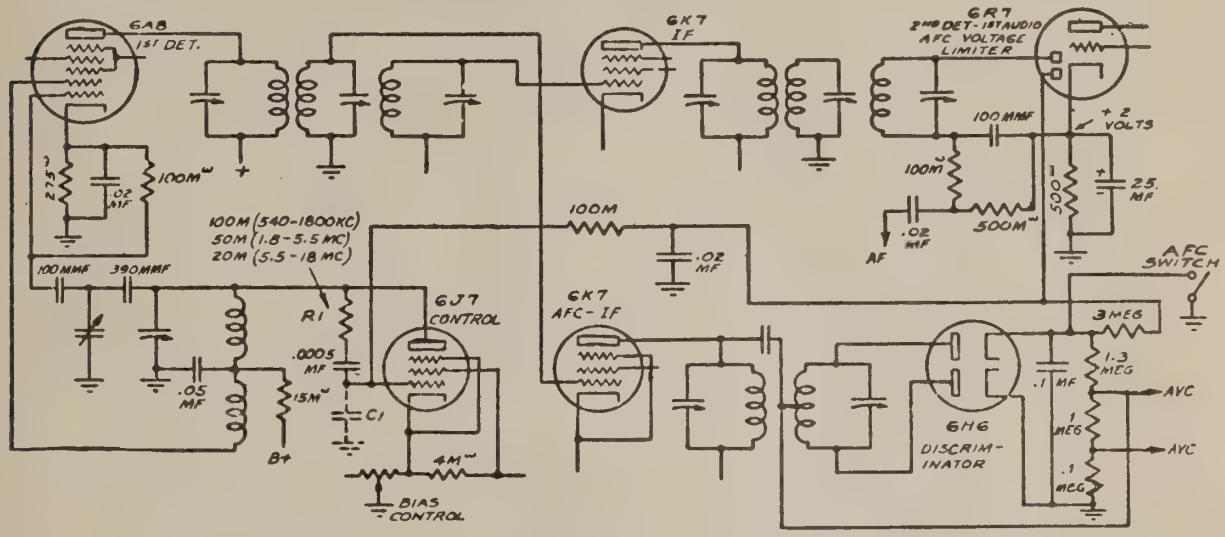


Figure 13

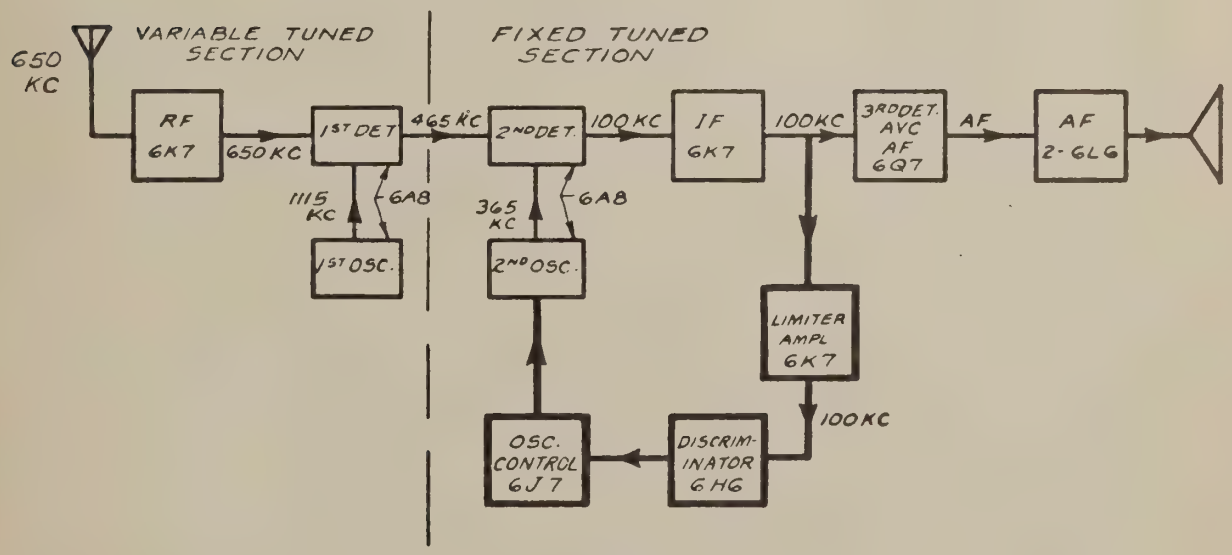


Figure 14

DOUBLE SUPERHETERODYNES—This type receiver appeared some time ago, and while it appears more complicated, is not as far as signal tracing is concerned. The primary difference between this circuit and the conventional is that the superheterodyne principle is applied twice. This means that two oscillators operating at different frequency are employed and the same is true of the intermediate frequency amplifiers.

first detector are traced with the Chanalyst in the conventional manner as outlined earlier in this chapter.

3. The i-f signal from the first detector then is fed into the second detector which also is a mixer operating with a second oscillator; hence the signal voltages at the new frequencies are checked with the Chanalyst.

4. The i-f signal out of this second detector or second mixer then follows in conventional manner into the third detector, which is the normal demodulator.

Thus it is a matter of checking signals at more frequencies than would be found in the conventional superheterodyne. Further, the fixed tuned section tube elements are accessible in exactly the same manner as in the conventional receiver. The a.f.c. system operates upon but one oscillator.

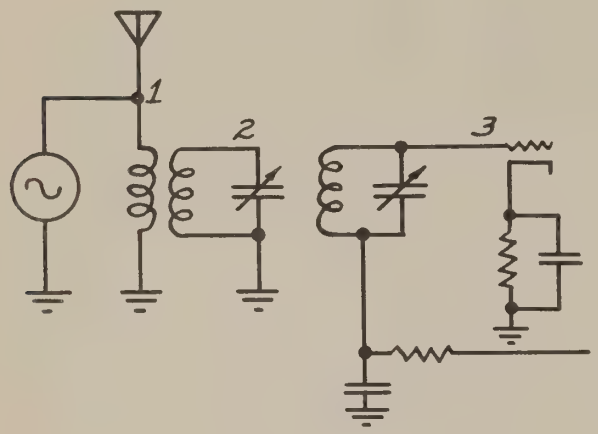


Figure 15

THREE CIRCUIT R-F TRANSFORMERS—Some receivers are equipped with three winding dual tuned r-f transformers, usually between the antenna and the mixer tube, as shown in Figure 15. The first winding is in the antenna system, the second winding is a link circuit to provide additional selectivity and the third winding, tuned like the second, feeds the mixer tube.

The process of tracing a signal through such a circuit is slightly different in that with the test oscillator connected across the antenna and ground, the maximum signal will appear across the link circuit. In other words, maximum increase in signal voltage will be noted between "1" and "2." The probe located at "3" will show a lower voltage than at "2," but added selectivity is obtained.

The probe location at "2" is the stator of the tuning condenser which tunes this link. The ground connection of the Chanalyst is connected to whichever portion of the receiver is the ground junction of the tuning condensers and the antenna system.

While as a rule, the signal voltage at "3" is less than at "2," this difference should not be extremely great. Incorrect tracking can be established by first checking the voltage at "2" and then advancing to "3." If maximum signal levels at "2" and "3" do not exist at the same setting of the gang condenser, it indicates poor tracking.

THREE CIRCUIT I-F TRANSFORMERS—As a general rule, there are two types of three winding transformers. In one type the third winding, operated in conjunction with a variable resistance, serves to vary the selectivity characteristics of the complete transformer. In the second type, the third winding serves to feed an i-f signal voltage into some special circuit, whereas the regular primary and secondary windings function as a conventional i-f transformer.

The first type is shown in Figure 16. As far as signal tracing is concerned, the signal across the primary and secondary is checked in normal manner, with the third winding resistance at maximum so that it has minimum effect upon the primary and secondary windings. The presence of this third winding can be checked by noting its effect upon the signal voltage at the grid end of the secondary winding with the variable resistance (selectivity control) in different positions. The less the resistance in this tertiary (third)

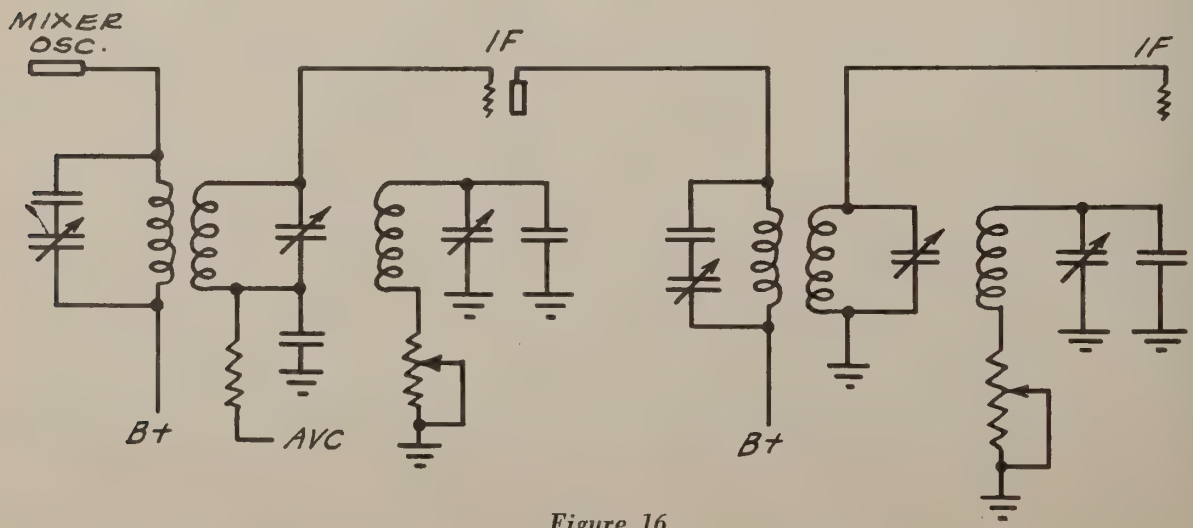


Figure 16

winding, the lower the signal voltage at the intermediate frequency at the grid end of the secondary winding. The reason for this is that decreasing the tertiary winding resistance broadens the response of the transformer and produces a hollow at the intermediate frequency in the response curve and peaks both sides of this frequency.

An absence of this effect, with normal operation otherwise, indicates a defect in the third winding. Since the various resistances associated with the i-f transformers in such a receiver are linked to one control, it is advantageous to be able to determine the condition of these windings.

Another method of checking these tertiary windings, which does not change the normal signal tracing process, is to check the increase in signal voltage at the "high" end of this transformer while turn develops a bias for a tuning indicator. In the event of trouble in the tuning indicator circuit, the first step is to check the signal voltage developed across this transformer by connecting the rf-if probe (red cable) to the "high" side of this winding and tuning the Chanalyst to the correct intermediate frequency, just as if it were the secondary winding of the i-f transformer.

Then the presence of the signal voltage upon the tuning indicator rectifier diode plate is checked in conventional manner by moving the Chanalyst probe (red cable) from the i-f transformer, "1," to the diode plate, "2." As you can easily see, this winding becomes just another winding that is checked for a signal and the absence of signal at either "1" or "2" calls for investigation of the possible reasons.

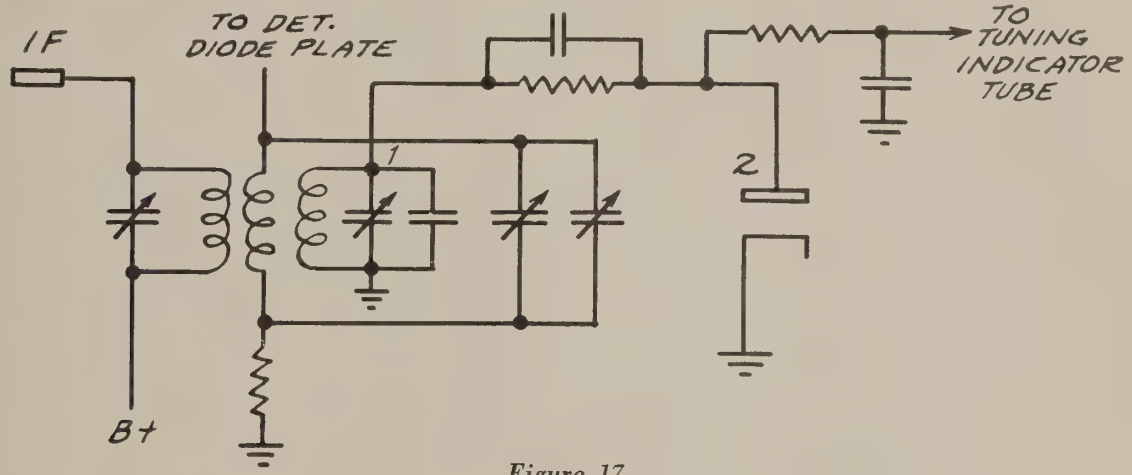


Figure 17

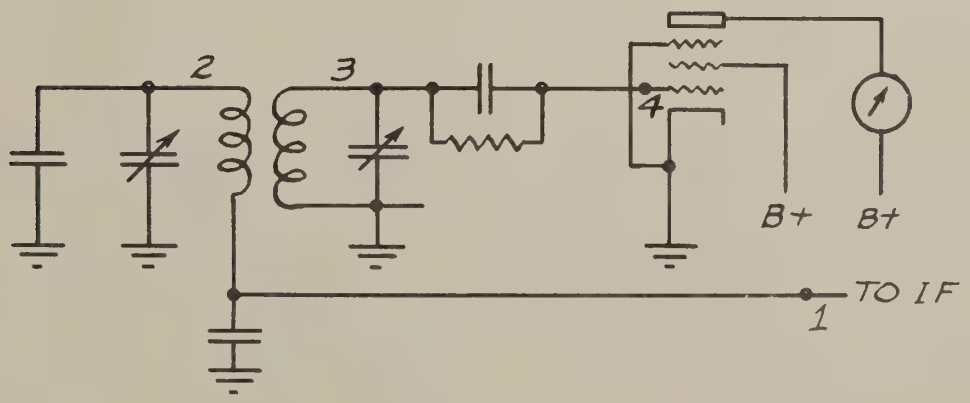


Figure 18

the selectivity control is varied from "maximum selectivity" to "high fidelity." This is done as a regular operation during the time that the signal tracing operation is being applied to the i-f amplifier. The probe (red cable) is placed in contact with the "high" end of these tertiary windings.

The second type of three winding i-f transformer is shown in Figure 17. Here the third winding is employed to feed a signal voltage (at the intermediate frequency) to a rectifier, which in

TUNING INDICATOR TRANSFORMER SYSTEMS—Tuning indicator systems are checked in a manner similar to that described in connection with triple tuned i-f transformer, which has a tuning indicator winding. The usual run of two winding tuning indicator transformers are operated at the intermediate frequency and secure their initial signal from some portion of the i-f circuit. The secondary of this transformer feeds the voltage to a tube which acts as a detector or

rectifier and the plate current variations cause changes in the tuning meter indication. See Figure 18.

The signal fed into these transformers and the signal fed from the transformer to the rectifier tube and the state of alignment is checked exactly as if it were another i-f transformer feeding an amplifier tube. With the signal fed into the antenna in conventional manner, the i-f signal fed into the tuning indicator circuit is checked by means of the rf-if probe (red cable) and the Chanalyst tuned to the intermediate frequency. This signal test is made right from the source of the i-f signal to the control grid of the tube as shown by "1," "2," "3," and "4." The remainder of the circuit, that relating to operating voltages, is checked by means of the Electronic Voltmeter.

SEPARATE A.V.C. TUBE SYSTEMS—The system which employs a separate tube to develop the a.v.c. voltage is treated exactly as if it were the a.v.c. diode in Figure 9. The signal voltage is traced from the i-f transformer which is the source, right to the control grid or whichever terminals of this tube receive this i-f voltage by moving the rf-if probe (red cable) along this feed wire and making contact with its junctions. The Chanalyst is tuned to the intermediate frequency of the receiver and the test signal is fed into the receiver at the antenna.

"Q" OR NOISE SUPPRESSION CIRCUITS—A number of "Q" circuits operate upon the i-f amplifier and secure the initial actuating voltage from the intermediate frequency amplifier, so that tracing of the signal fed into the control circuit is done in accordance with the normal routine used to check an i-f signal any place in the i-f or associated system. Whatever other operating voltages are associated with such circuits are checked with the Electronic Voltmeter.

MULTI-WAVEBAND RECEIVERS — Multi-waveband receivers are checked for signal passage through the system in conventional manner, except for one difference. This is that the r-f portion of the receiver inclusive of the mixer input transformer is checked at broadcast frequencies. The oscillator section of the receiver is tested at whatever frequency may be required, beginning at 600 kc and up to 14,000 kc.

The reason for this is that if the receiver operates upon the broadcast band and does not operate upon the short wave band, and it is possible to check the oscillator system upon the short wave band and establish its normal operation, then the difficulty is immediately identified as being in the r-f portion of the radio receiver.

Another exception to this rule applies to receivers which have a "weather" band of from 140 kc to about 400 kc. Such receivers may be checked over this band as well as the broadcast band, by using the RF-IF Channel for all signal tests.

The manner of checking high frequency oscillator circuits in multi-waveband receivers is described in the chapter devoted to the Oscillator Channel.

TESTING WITH AN OSCILLOGRAPH—The usual application of the oscillograph in connection with the Chanalyst is for distortion checking. This operation is described in full detail under the heading of "DISTORTION TRACING."

USING THE VOLTMETER FOR SIGNAL TRACING—The Electronic Voltmeter can be used as an indicator when tracing a signal through a receiver.

The voltmeter is plugged into the rf-if pin-jack, just as used for checking antenna pick-up or station signal comparison. Then the test oscillator output is adjusted so as to produce an indication of about 1.5 volts on the 5-volt scale. The voltmeter then becomes the reference indicator and is used throughout the test as such, with 1.5 volts on the 5-volt scale as the reference setting or indication.

AC-DC RECEIVERS—When working with ac-dc receivers, the Chanalyst free ground should be connected to the frame of the tuning condenser gang for signal tests, if that point is the return for the signal circuits.

The return for operating voltage tests is discussed in connection with the Electronic Voltmeter.

The remainder of the operations during signal tracing or voltage measurements is exactly as outlined.

BATTERY OPERATED RECEIVERS—Battery operated receivers are checked exactly as a-c receivers. Since the chassis is generally the ground point, when tracing signals the Chanalyst ground must be connected to the chassis.

THE RF-IF CHANNEL AS A TUNING INDICATOR—In some cases, the receiver being tested may be wholly inoperative and some means is necessary to know when the receiver is tuned to the signal output of the test oscillator. The RF-IF Channel can be used as the tuning indicator by resonating the Chanalyst to the test oscillator frequency and placing the probe tip on the control grid on the tube nearest the antenna and tuning the receiver until maximum signal voltage is indicated upon the Chanalyst Magic Eye. This at least is a good starting point when working upon such receivers.

TESTING OSCILLATING RECEIVERS—After the usual service procedure of testing tubes, cleaning and tightening gang-condenser rotor wipers, and checking the cathode bias of r-f tubes in receivers without a.v.c. the signal generator should be connected to the input terminals of the receiver (if a signal is required to produce oscillation). Testing should be done under the same conditions present when the trouble is noted. If

the receiver oscillates over one portion of the band but not at another, test at the frequency where oscillation occurs. In some cases, the loading effect of the signal generator will stop oscillation in the antenna stage. A small blocking condenser or dummy antenna will overcome this effect and permit testing to continue. If the receiver oscillates with no signal, then none is required for our tests.

The usual procedure described under "SIGNAL TRACING" should be used to localize the cause of oscillation. Oscillation in the i-f stage will usually be indicated by a strong i-f signal on the RF-IF Channel Magic Eye with no signal fed into the receiver. Oscillation of the i-f stage will also produce a high a.v.c. voltage which can be measured with the Electronic Voltmeter Channel (blue cable) probe.

Oscillation in the r-f stage will be indicated by a strong r-f signal on the RF-IF Channel Magic Eye, with no signal fed into the receiver. The frequency of the r-f oscillation will depend on the dial setting of the receiver.

THE RF-IF CHANNEL FOR DISTORTION TRACING—In the preceding discussion, our primary concern has been to check the signal level throughout the r-f and i-f portions of the receiver. We have not considered the CHARACTER of the signal which we are checking. It is possible that some condition is present in these sections of the receiver which affects the fidelity of the signal, but not the signal level. If such distortion is introduced, it will not be registered on the channel Magic Eye. However, both the RF-IF and AF Channels are provided with output jacks, as described in the Introduction, so that a cathode-ray oscillograph or headphones may be plugged in and the distortion noted visually or aurally. The Chanalyst probe system of testing removes the difficulties formerly encountered in attempting to connect the oscillograph across tuned circuits and thus enables the signal to be studied without retuning or otherwise disturbing the circuit under test.

Let us first consider the application of the RF-IF Channel and the oscillograph to distortion tracing in the receiver. We shall require a test oscillator producing a modulated signal, preferably free from distortion (though even a distorted signal may be used). The receiver is set up in the same manner already described for signal tracing. Instead of checking the signal level at each point in our signal-tracing procedure, we examine the wave form of the signal at each point on which the rf-if probe (red cable) is placed. This wave form is compared with an initial reference image, representing that of the signal at the receiver input. Should the two wave forms differ, some receiver circuit is adding distortion. Components affecting the operation of the receiver, at the point in the normal signal path where distortion is first noted, are then checked until the trouble is located.

For example, let us assume that we are still set up to follow the signal-tracing procedure described before. The test oscillator is feeding a 600-kc modulated signal to the receiver input, and the RF-IF Channel as well as the receiver has been tuned to this signal. Our first step in distortion tracing is to obtain our initial reference wave form. To do this, we proceed as follows:

1. To connect the oscillograph to the RF-IF Channel output jack (in the rear of the Chanalyst) by means of a plug and shielded cable.

2. Place the rf-if probe (red cable) on "1," in Figure 9.

3. Adjust the test oscillator output until a strong signal is indicated on the channel eye when the "LEVEL" and "MULTIPLIER" controls are both set at "1."

4. With the oscillograph in operation, adjust its vertical amplifier gain control until a wave of convenient height appears.

5. Now adjust the oscillograph horizontal sweep until the wave is synchronized. Note the wave shape; this is our initial reference wave form.

We can now check the signal wave form at any point in the r-f or i-f system. To save time, it is convenient to test first at readily accessible points, such as the control grids of each tube in the r-f, mixer, and i-f sections. These are indicated on Figure 9 as "2," "4," and "6." At each of these points, the signal should become progressively stronger. The image on the oscillograph will correspondingly increase in height. DO NOT change the oscillograph amplifier adjustments; maintain an image of constant height by adjusting the RF - IF channel "MULTIPLIER" and "LEVEL" controls. This is done to avoid overloading the RF-IF Channel. However, no detectable distortion will occur in the RF-IF Channel even with a 1-volt signal at the probe point or 10 millivolts at the "RF-IF" input jack.

In checking for distortion, it is well to maintain a fairly strong input signal to the receiver. Often distortion is caused by defective a.v.c. action and this condition will not be evident on weak signals. A good input signal is that just sufficient to close the RF-IF Channel Magic Eye when the probe is on "1." This is approximately 7 millivolts.

6. To proceed with our testing, place the rf-if probe (red cable) on "2." After adjusting the oscillograph image height, examine it to see if the wave form is perceptibly different from the original wave form. If regeneration is present, the wave form will be affected. Other conditions can likewise affect the wave form at this point. Checking a.v.c. voltage, tube voltages, wiring, and components affecting the operation of this stage will reveal the cause.

It is unnecessary to analyze in detail the possible troubles which may cause distortion at each of the remaining test points; this has already been

done in regard to signal-tracing. The essential difference between signal tracing and distortion tracing by this method is that in the former case, we compare the signal level at the point tested with an original reference signal level, while, in the latter case, we compare the signal wave shape at the point tested with an original reference wave shape.

An example of the type of defect readily shown by this test procedure is given in the oscillograms reproduced on this page. Defective a.v.c. action due to condenser leakage causes the last i-f stage to become overloaded. The reference wave form (Figure 19) is seen to be substantially a pure sine wave, while the wave forms due to overloading (Figures 20 and 21) are badly distorted. Figure 20 shows the distortion when the internal resistance of the condenser drops to 1 megohm and Figure 21 shows the effect when the internal resistance is 0.1 megohm. This effect would be revealed by placing the rf-if probe (red cable) at "10," Figure 9, the plate of the last i-f tube (also by checking the a.v.c. voltage on each side of the time-delay resistor to determine that there is no drop across it due to leakage current). Misalignment of the i-f stages produces similar effects.

low-frequency end of the standard broadcast band should be tuned in. The headphone should be of the crystal, or similar high-impedance, type. Such phones may be directly plugged in the rf-if channel output jack. Low impedance magnetic phones likewise may be used provided a suitable matching transformer is employed. A line-to-grid type, with the line winding connecting to the phones and the grid winding to the Chanalyst jack, will be satisfactory provided there is a reasonably good match of the line winding to the impedance of the phones.

Our original reference signal is obtained by placing the rf-if probe directly on the antenna post of the receiver. With the antenna connected, the broadcast station is then tuned in on the Chanalyst. The signal will be clear and undistorted in the headphones. If the volume is not as great as desired, the AF Channel can be connected to the RF-IF Channel to provide additional amplification, as shown in Figure 22. This is done by fitting a standard telephone plug to each end of a shielded cable. One plug is then inserted in the RF-IF Channel output jack, in place of the phones. Then insert the other plug in the AF

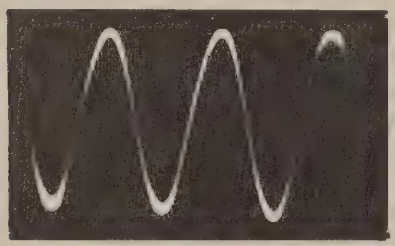


Figure 19

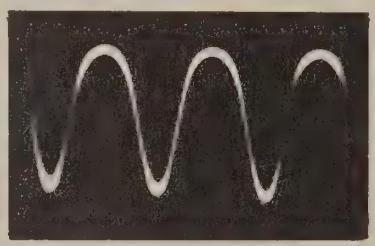


Figure 20

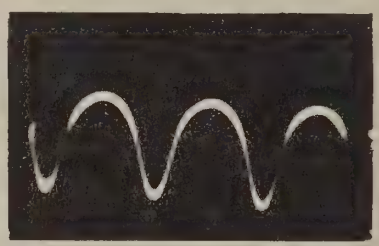


Figure 21

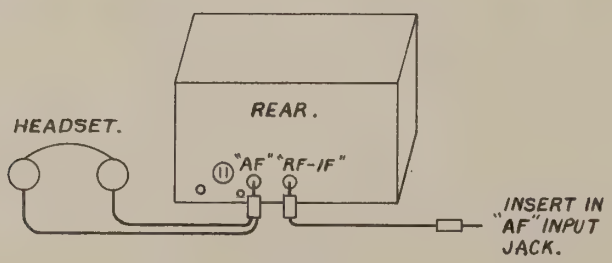


Figure 22

DISTORTION TRACING WITH HEADPHONES—The procedure for tracing distortion using headphones in place of the oscillograph follows substantially that outlined above, with two important differences. The signal is traced in the same manner, but it will be found difficult to distinguish slight distortion which is immediately evident on the oscillograph.

Testing with headphones is facilitated by employing a broadcast signal, rather than a test oscillator, for our reference signal. Accordingly, an antenna and ground should be connected to the receiver and a strong, local station near the

Channel input jack. The headphones are now plugged in the AF Channel output jack. The signal level to the headphones may then be controlled either by the "AF" level control or those of the RF-IF Channel. It is preferable to use the latter, to avoid overloading the RF-IF Channel. Note that the AF Channel Magic Eye will be inoperative when its output jack is in use.

Testing procedure follows the usual signal-tracing order. The character of the signal at the point on which the rf-if probe (red cable) is placed is compared with that at the antenna post simply by replacing the probe point on the antenna post,

from time to time, and re-adjusting the controls of the RF-IF Channel to keep a constant signal level.

Tracing distortion in the a-f system is covered in the chapter devoted to the application of the AF Channel.

DISTORTION TRACING WITH LOUDSPEAKER—The output stage and loudspeaker of an a-c radio receiver may easily be connected to the output jack of the AF Channel for use in tracing distortion. It may be used for tracing distortion in the a-f system, by using the a-f (green cable) probe, or in the rf-if system by using the rf-if (red cable) probe and connecting the RF-IF Channel output jack to the AF Channel input jack as shown in Figure 22A.

plug in the AF Channel output jack. Connect the other end of the cable to the control grid of the output tube in the a-c radio receiver. Connect the shield of the cable to the receiver chassis.

Use a shielded cable fitted with a standard telephone plug at each end to connect the RF-IF Channel output jack to the AF Channel input jack.

If the receiver that is being used has a push-pull output stage, connect the shielded cable to the control grid of the output tube that feeds the phase inverter.

(Another method of connection can be used if the a-c radio receiver has phonograph terminals or a phonograph jack connected in such a way

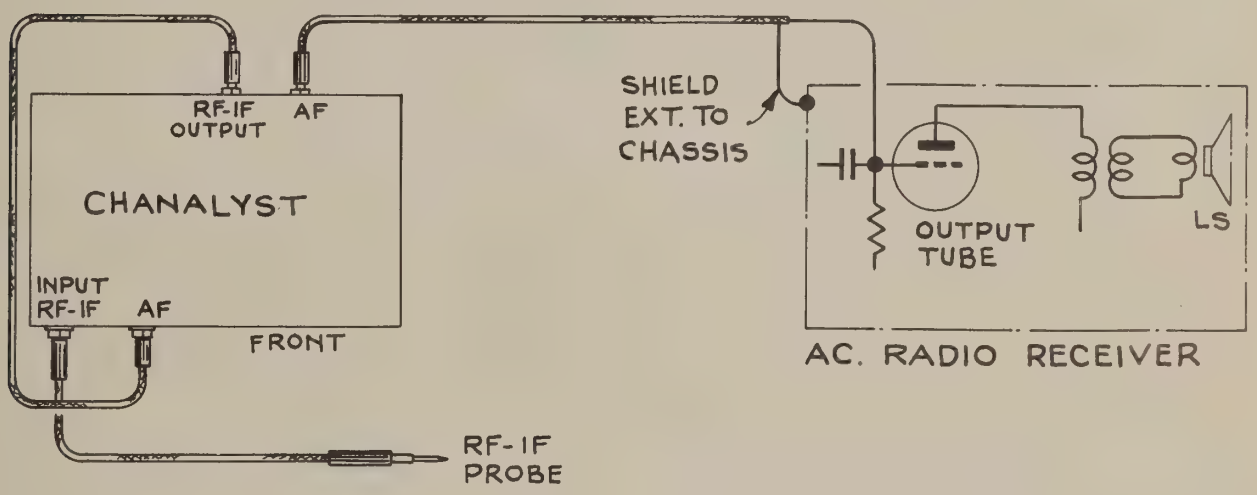


Figure 22a

The method of connecting the output stage and loudspeaker of an a-c radio receiver to the Chanalyst is as follows:

Connect a standard telephone plug on one end of a shielded single conductor cable. Connect the cable to the tip of the plug, and connect the shielding to the sleeve of the plug. Insert the

that the radio volume control also controls phono volume. In this case, connect the shielded cable from the a-f output jack to the phono input terminal or jack on the receiver. Connect a 2.0-megohm ¼-watt resistor in series with the cable at the receiver-end of the cable. Keep the volume control on the receiver turned down to a low point.)

HOW TO OPERATE THE OSCILLATOR CHANNEL

The Oscillator Channel is used for testing the operation of any oscillating circuit over a range of from 600 kc to 15,000 kc. The Oscillator Channel is NOT in itself an oscillator; it is essentially a wide range frequency meter. Its sensitivity is lower than that of the RF-IF Channel.

PRELIMINARY ADJUSTMENTS OF THE OSCILLATOR CHANNEL—The frequency range of the Oscillator Channel, 600 kc to 15,000 kc, is

covered in three bands by setting the "OSC. BAND SWITCH" (third from right on panel) to each band desired and rotating the large tuning knob marked "OSC." on the panel. The oscillator "LEVEL" control is adjusted for maximum sensitivity by turning the knob until it points to "1." The other calibration points indicate the approximate relative signal strength at different settings of the "LEVEL" control.

The oscillator cable plug (brown cable) should be inserted in the jack marked "OSC." at the lower right-hand corner of the Chanalyst panel.

OPERATION OF THE OSCILLATOR CHANNEL—When the oscillator probe point is placed near or in contact with any oscillating or signal-carrying tuned circuit, the signal is fed to the Oscillator Channel. When the channel is tuned to resonance with the circuit under test, the presence of the signal is indicated on the Magic Eye of the Oscillator Channel (upper right of panel). On weak signals the eye will partly close; on stronger ones it will overlap. When overlapping occurs, turn the oscillator "LEVEL" control to the right until overlapping ceases or move the oscillator probe point a fraction of an inch away from the circuit under test. For best results, place the probe as shown in Figures 11 and 12. The frequency of the oscillator is shown by the dial calibration. The channel is properly tuned when turning the "OSC." knob either to the right or left of the proper point causes the channel eye to open.

A pin jack is located at the right near the oscillator "LEVEL" control into which the Electronic Voltmeter probe (blue cable) point may be inserted. When the voltmeter is set on the 5-volt scale, a reading of approximately —0.5 to —1.0 volt will show when the probe is inserted in the pin jack due to contact potential. When the oscillator channel is tuned near the frequency of the signal picked up by the oscillator probe, this reading increases. The maximum negative voltage is indicated on the meter when the channel is tuned precisely to the oscillator signal at the probe point. Though this probe point is isolated from the oscillator cable by a capacity of approximately 1.0 mmfd., even this small capacity may cause appreciable detuning of oscillators at extremely high frequencies. The added sensitivity of the meter indication makes it possible to pick up a signal strong enough to give an indication even when the probe point is well away from the circuit under test and detuning is then negligible.

CHECKING OSCILLATORS IN SUPERHETERODYNES—To check a superheterodyne oscillator, proceed as follows:

(1) Set the "OSC. BAND SWITCH" to the proper range. The receiver oscillator, in the majority of receivers is at a higher frequency than that to which the receiver is tuned. The difference between the receiver oscillator frequency and the frequency of the incoming signal to which the set is tuned is the intermediate frequency. Thus, if we tune the receiver to 600 kc and the i-f is 465 kc, the set oscillator should be operating at 1065 kc.

(2) Place the oscillator probe point on the stator of the oscillator section of the set tuning condenser and tune the Oscillator Channel until the channel Magic Eye closes.

(3) Now move the probe point away from the variable condenser stator (usually the point may be placed on the condenser insulation about an eighth of an inch from the stator lug) and re-adjust the channel tuning until the channel eye shadow decreases most. (Or use the voltmeter indication as described above.) The operating frequency of the receiver oscillator is now indicated by noting the frequency under the hair-line pointer of the channel tuning knob. Under the conditions stated, this should be 1065 kc.

It follows that once we know the operating frequency of the oscillator when the receiver is tuned to a known signal frequency, we can discover what the i-f should be, assuming the oscillator is properly adjusted. In the case given, if we subtract 600 kc, the frequency of the incoming signal to which the receiver is tuned, from 1065 kc, the operating frequency of the oscillator when the receiver is so tuned, the intermediate frequency of 465 kc is determined. This feature will be of great value when the i-f transformers in a given receiver are inoperative and it is necessary to order replacement when data are not available on the i-f transformers.

If the oscillator signal cannot be picked up at or near its expected frequency, try each higher frequency band of the oscillator channel by setting the "OSC. BAND SWITCH" to each higher-frequency band, in turn, and rotating the tuning knob "OSC." over the range. If the signal cannot be picked up on any band, place the Electronic Voltmeter probe (blue cable) on the oscillator grid. If the oscillator is not operating, zero or a positive voltage will be indicated. If the oscillator is functioning, the voltage indicated will be negative.

TESTING FOR OSCILLATOR DRIFT—Receiver fading is often caused by oscillator frequency drift. To test for this trouble, proceed as follows:

(1) Screw the metal clip, provided for the purpose, over the oscillator probe point and connect the clip on, or near, a lug on the oscillator tuning condenser.

(2) Tune the channel to resonance and adjust the oscillator "LEVEL" control until the channel eye just closes, or if the Electronic Voltmeter probe is inserted in the oscillator pin jack, until a maximum negative voltage is shown.

(3) Allow the receiver to operate until the trouble appears, then note if the channel Magic Eye appearance or voltmeter indication has changed.

(4) Retune the Oscillator Channel and note if the frequency has changed. If so, the eye will just close at some other setting of the Oscillator Channel tuning condenser. This new setting will show, not only that the oscillator has drifted, but also how much and in which direction.

The receiver oscillator circuit should then be checked, testing each component until the fault is located.

TESTING OSCILLATOR COUPLING CIRCUITS—In many of the older receivers not employing pentagrid converters, the oscillator is coupled either through a capacity or coupling coil to the mixer tube. The channel may be used to trace the oscillator signal at each point up to the mixer plate.

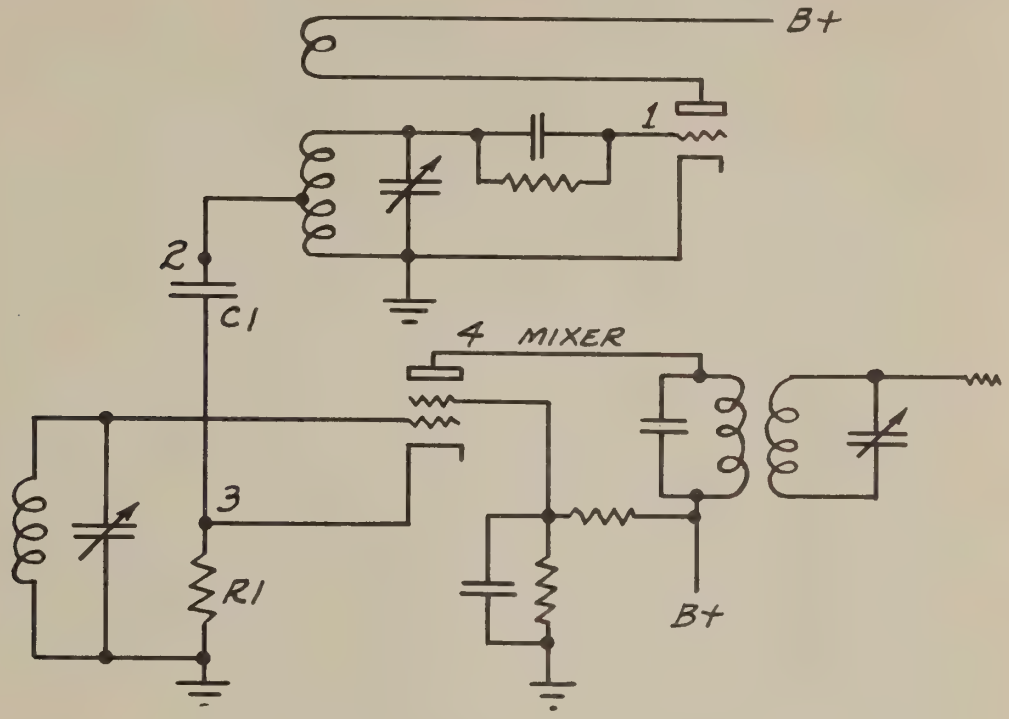


Figure 23

A typical circuit employing capacitive coupling to the mixer cathode is shown in Figure 23. Performance of the oscillator is first established by placing the oscillator probe (brown cable) on "1" and following the procedure described above.

(1) Place the probe at "2." The signal should be present, if absent, connections must be checked.

(2) Place the probe at "3." Presence of the signal shows that C1 and R1 are not grounded. Absence of the signal indicates either a short or open circuit.

(3) Place the probe at "4." The signal should be present. If not, there is trouble in the mixer tube or circuit.

The oscillator section of a typical pentagrid converter is shown in Figure 24. To check its operating frequency, place the probe near the stator lug of the tuning condenser, "1," or near the socket anode terminal, "2."

USING THE OSCILLATOR CHANNEL TO ADJUST OSCILLATOR CIRCUITS IN PUSH-BUTTON RECEIVERS—In push-button receivers that use trimmers or cores for the push-button oscillator circuits, it may be found that there are several different adjustments of the push-button oscillator trimmers that will tune in local stations. The correct adjustment is usually the one where the oscillator frequency is equal to the desired station frequency plus the i-f frequency. Thus if the desired station is at 1000 kc, and the i-f is 455 kc, the push-button oscillator circuit should be adjusted to 1000 plus 455, or 1455 kc. The correct adjustment of each push-button oscillator trimmer can be quickly made by using the oscillator channel (brown cable) probe, turning the "OSC." tuning knob to the correct frequency, and adjusting the push-button oscillator trimmer for maximum indication on the "OSC." Magic Eye. Final adjustment of the trimmers should be made on actual reception.

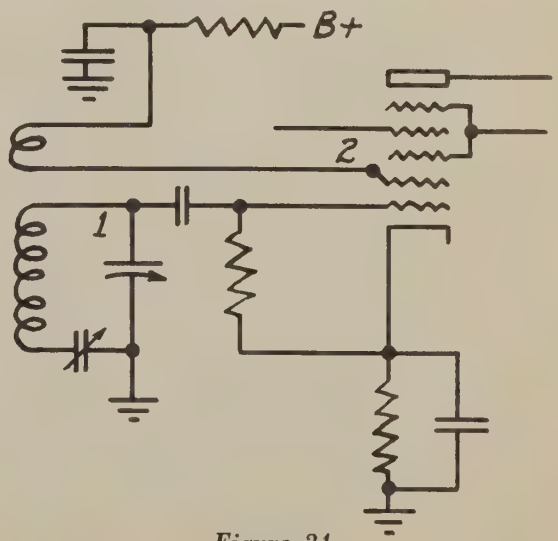


Figure 24

This application of the Chanalyst is particularly desirable on loop-type push-button receivers with an untuned r-f stage in locations where there are one or more strong local stations. However, with any trimmer-type push-button receiver, the oscillator channel may be used to determine quickly and definitely the frequency of any or all of the push-button oscillator circuits.

HOW TO USE THE AF CHANNEL

Now that you have followed the signal through to the detector, the next step is to trace it through the audio circuit. This is done with the AF Channel.

PRELIMINARY ADJUSTMENTS OF THE AF CHANNEL—The AF Channel controls should first be adjusted for maximum sensitivity. This is done by throwing the multiplier switch (marked "AF" at the top center of panel) to 1 and turning the pointer knob on the "AF" level control (top left of panel) to 0.1. Insert the green cable plug in the "AF" channel jack (second from left on panel). Hold the probe handle with your fingers well back from the probe point. This avoids extraneous pickup due to the high sensitivity of the channel.

OPERATION OF THE AF CHANNEL—The presence of an audio signal, noise or hum voltage at any point on which the probe point is placed is indicated by a change in the shadow area of the AF Channel Magic Eye (second from left at top of panel). Weak signals will partly close the eye, while stronger ones will cause it to overlap. The strength of the audio signal can be determined by operating the "AF" level control, the "AF" multiplier switch, and observing the channel eye. With the AF level control knob turned to "0.1" and the multiplier switch on "1," an audio signal of approximately 0.12 volt will just close the eye. If the level control knob is turned to "1" instead of "0.1," 10 times as strong a signal is required to close the eye. At any other setting of the level control knob, the strength of the signal is likewise proportional to the reading noted on the level control calibration and the actual voltage is 1.2 times this reading. If the eye overlaps even when the level control is turned to 10, throw the multiplier switch to 100 and re-adjust the level control until the eye just closes. The signal strength is then 100 times that indicated by the level control calibration point to which the knob is turned.

Noise and hum are indicated on the channel eye by a fuzzy pattern rather the the usual clearly defined shadow area. Sputtering noise shows up as flickering of the Magic Eye. Noise, hum, and distortion can be heard by plugging in high-impedance crystal headphones in the channel output jack at the rear of the Chanalyst near the receiver power plug receptacle. If desired, a cathode-ray oscillograph may be plugged in instead of headphones and the signal observed on the cathode-ray screen. *When either is plugged in, the channel eye is automatically cut out of the circuit and therefore will not register.*

TRACING THE AUDIO SIGNAL—The audio signal is traced in the same manner as the r-f and i-f signal. The signal generator is connected to the antenna and ground terminals of the receiver. The modulated signal fed into the receiver should first appear as an audio tone at the second detector of a superheterodyne or at the detector of a tuned r-f receiver, so testing with the AF Channel starts at this point.

Testing is done by placing the a-f probe (green cable) directly at each point in the receiver audio system where the signal should normally be present and noting the signal strength and character as indicated by the AF Channel. The normal path of the signal from detector to voice coil is followed and if at any point along this path the signal becomes distorted, weaker, or disappears, this condition will be indicated by the AF Channel. Components likely to cause trouble at any such point are then checked and the fault is located. This method keeps the number of tests required to an absolute minimum and therefore affords the utmost possible speed in shooting trouble.

TESTING INOPERATIVE (DEAD) RECEIVERS—A typical detector-audio system is shown in Figure 25. After the signal has been traced to the detector with the RF-IF Channel, the audio signal should first appear across R1 and R2. The normal path of the audio signal follows in numerical order from "1" to "6."

1. Place the a-f probe (green cable) on "1," making certain that the receiver volume control is at maximum. If no signal is present (indicated by failure of the channel eye shadow area to change) check the components in this circuit. If the signal is present at "1," continue as follows:

2. Place the probe on "2." If no signal is found, check C1 and other components between "1" and "2." If the signal is present:

3. Move the probe to "3." At this point, the signal will normally be amplified and the channel Magic Eye may overlap. When this occurs, turn the level control to the right until the eye no longer overlaps. The exact position is of no consequence as long as the presence of the signal is indicated because our primary concern with a "dead" receiver is in finding the point in the normal signal path where the signal FIRST disappears, and not the relative strength of the signal at various points. When this point is located, test the components affecting the operation of that particular circuit and the trouble will be discovered. At "3," no signal might indicate an open

plate resistor, an open cathode resistor or similar defect in that specific stage. The same reasoning applies at any other of the numbered points in the amplifier circuit. If the signal is present even at the last point, "6," we know it is feeding the speaker voice coil and since no sound results, we must check the speaker coil circuit.

TESTING WEAK RECEIVERS—In the case where the complaint is weak reception, we know the signal will be present at all points, along its normal path. We will assume that the usual quick test of placing a screwdriver or other magnetic metal object in the speaker has shown that the speaker field is functioning by attracting the metal to its core and that the RF-IF Channel tests have shown a strong signal at the detector. In all probability then, the amplifier is not providing sufficient gain so that the speaker can operate properly. Usually this means that one stage is delivering far below its normal signal amplification, since small changes in amplification are readily compensated for by turning up the volume control and therefore pass unnoticed by the customer. To locate the trouble, therefore, we need only a rough idea of how much gain per stage we should expect in a given audio amplifier. With the AF Channel, we can quickly measure the gain per stage as well as the overall gain of the amplifier. This is done in the following manner:

1. With the signal generator still connected to the receiver input as for the RF-IF Channel tests, which usually should precede the audio tests, adjust the signal generator output until the AF Channel Magic Eye just closes when the a-f probe (green cable) point is on "1," and the receiver volume control is at maximum.

2. Now place the probe (green cable) point on "2." The Magic Eye should again just close, indicating that the signal level has not changed. If the eye opens appreciably, check C1 and wiring between "1" and "2." If the signal is of the same strength as at "1," proceed to test the amplification of the first audio stage.

3. When the probe (green cable) is placed on "3," the Magic Eye should overlap. If so, turn the level control to the right and note the reading at which the eye again just closes. The control was originally set at 0.1; if it now reads 3, the signal has been amplified 30 times. This is about what we should expect in an audio stage employing a high-mu triode, though in some receivers the gain may be considerably higher, ranging up to 70. Data on gain per stage with different tubes and loads are given in another section, but for trouble-shooting purposes precise information is not necessary. If there were anything radically wrong at this point, the measured gain would be far below the value given.

4. Now move the probe (green cable) to "4." The signal level will not change between "3" and "4" unless there is some trouble in this portion of the circuit.

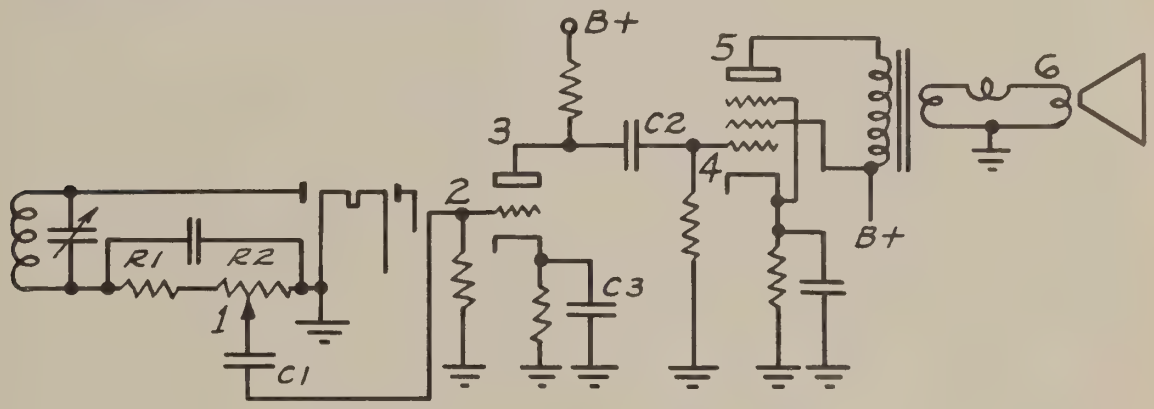


Figure 25

5. With the probe (green cable) at "5," the power tube plate, the signal should be further amplified. Much depends upon the output transformer characteristics, but normally we find gains ranging from 5 to 20 and therefore, the eye will again overlap. In all probability, turning the level control all the way to "10" will be insufficient to restore the Magic Eye to a "JUST-CLOSED" position, so throw the multiplier switch to "100" and again re-adjust the level control. If it now reads .3, the overall gain from the detector to the output plate is 300 and the gain in the power stage is 10, since the first audio stage contributed a gain of 30.

6. At the voice coil, the signal voltage will be far lower than at the power tube plate since it has been stepped down by the output transformer. Much depends upon the output transformer design and the voice coil impedance, but a step-down of at least 25 or 30 to 1 between a pentode plate and a 10-ohm voice coil should be expected. Therefore, when we place the probe on "6," the eye will not close until we throw the multiplier switch to "1" again and re-adjust the level control. If the signal level showed a gain of 300 to

the power tube plate and the step-down to the voice coil were 30 to 1, the signal gain measured at the voice coil would be 10. The channel eye would accordingly just close when the level control is set at 1 and the multiplier switch is likewise on "1."

If at any point, in this test routine, the signal level is greatly below that expected, stop to check the components in the stage where the trouble is noted. Once the fault is located and corrected, mark down in your service manual or on the receiver schematic diagram the signal level at each stage so that you may know what to expect from a similar receiver when it comes in for test.

In some receivers with very high gain in the audio section, the signal strength may reach such a high level at the power tube grid that the output tube is overloaded. If this is the case, which can be determined by placing the Electronic Voltmeter probe (blue cable) on "4" and noting if a negative voltage is indicated at this point, reduce the signal level until the eye just closes with the level control on "0.5" AFTER measuring the gain between "2" and "3." The gain between "4" and "5" may then be measured just as it was between "2" and "3."

In some receivers there may normally be several volts of hum at the plate of the output stage. In such cases, it is necessary to use a signal of 5 to 10 volts at the grid of the output stage so that the signal on the plate will swamp out the hum to permit accurate gain measurement.

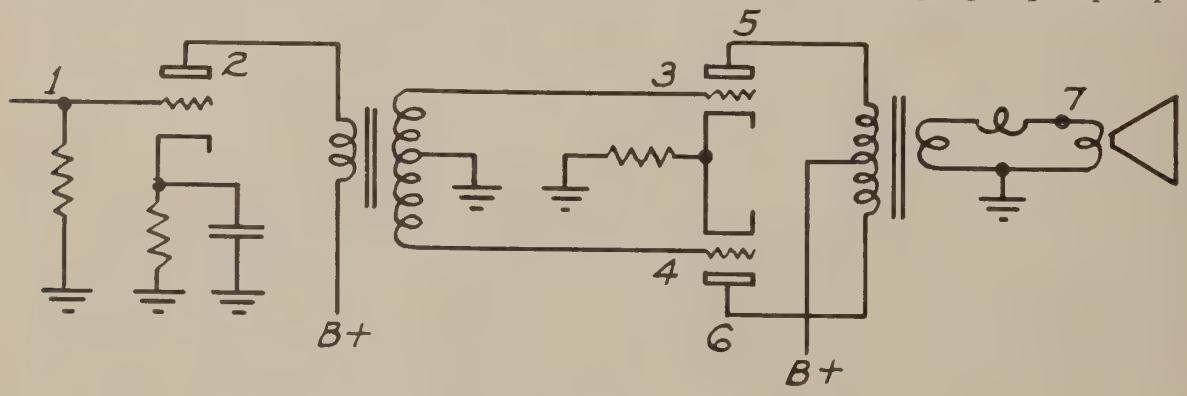


Figure 26

It cannot be too strongly emphasized that falling into the habit of making exact measurements of stage gain is a waste of time in practical servicing. Find the trouble, fix it, and start another job. Then you will derive the maximum benefit from your Chanalyst.

SERVICING NOISY RECEIVERS—If noise is present in a receiver, we need no signal generator. What we should look for is the noise signal. Assuming that the signal generator has been disconnected and the circuits up to the detector have been checked for noise with the RF-IF Channel, we start in the usual manner to look for noise in the detector circuit.

1. Again referring to Figure 25, adjust the "AF" level control for maximum sensitivity by turning the knob to "0.1" and the multiplier switch to "1."

2. Now place the AF probe (green cable) on "1." If noise is present, it shows on the channel eye as flickering. Or, for better identification, plug in headphones in the jack at the rear of the Chanalyst and listen for noise.

3. If quiet, proceed to "2," "3," and so on, until a point in the signal path is found where noise is present. When this point is located, check components and connections at this point until the fault is discovered. Noise might be present at "3"; we can check at this point by merely moving the AF probe to the plate resistor "B" plus terminal. If there is no noise at the latter point, either the plate resistor or the tube and its connections may be at fault. Similarly, noise at "4" but not at "3" is likely to indicate a defective coupling condenser. Wherever noise is FIRST detected in the normal signal path is where we must test; subsequent tubes and circuits merely amplify the trouble.

TESTING PUSH-PULL CIRCUITS—Testing of audio circuits in which push-pull operation is obtained either by a push-pull transformer or a phase inverter tube follows along the same general signal-tracing routine. In addition, it is possible to check quite simply for proper phase inverter action.

Figure 26 shows a commonly-used circuit employing transformer coupling to push-pull power tubes. The signal is traced by placing the probe at each numbered point in the order marked.

1. At "3," the signal voltage indicated by the channel Magic Eye and "AF" level control setting should be noted. The channel eye should just close.

2. Now, when the probe is placed on "4," the signal level should be the same as at "3" if the transformer is perfect. If not, the channel eye will either open or overlap. Minor differences in signal level at "3" and "4" are of no consequence, but a large difference means trouble in this circuit. Perhaps one-half of the transformer secondary may have shorted turns. Perhaps the signal may be completely absent at either "3" or "4." The receiver will still function but will be notice-

ably defective. Checking components at the point in the circuit where the trouble is noted will reveal the cause.

3. In the output circuit, the signal level at "5" and "6" should be checked with alternate tubes pulled out of sockets, as the output transformer primary action will show the same reading at "5" and at "6," even though one tube is inoperative.

LOCATING THE CAUSE OF EXCESSIVE HUM—The cause of excessive hum is likewise located without the use of a signal generator. Hum is indicated on the AF Channel Magic Eye by a fuzzy pattern. If desired, headphones or the cathode-ray oscillograph may be plugged in the AF Channel jack in the rear and the hum heard or registered on the cathode-ray tube screen. When

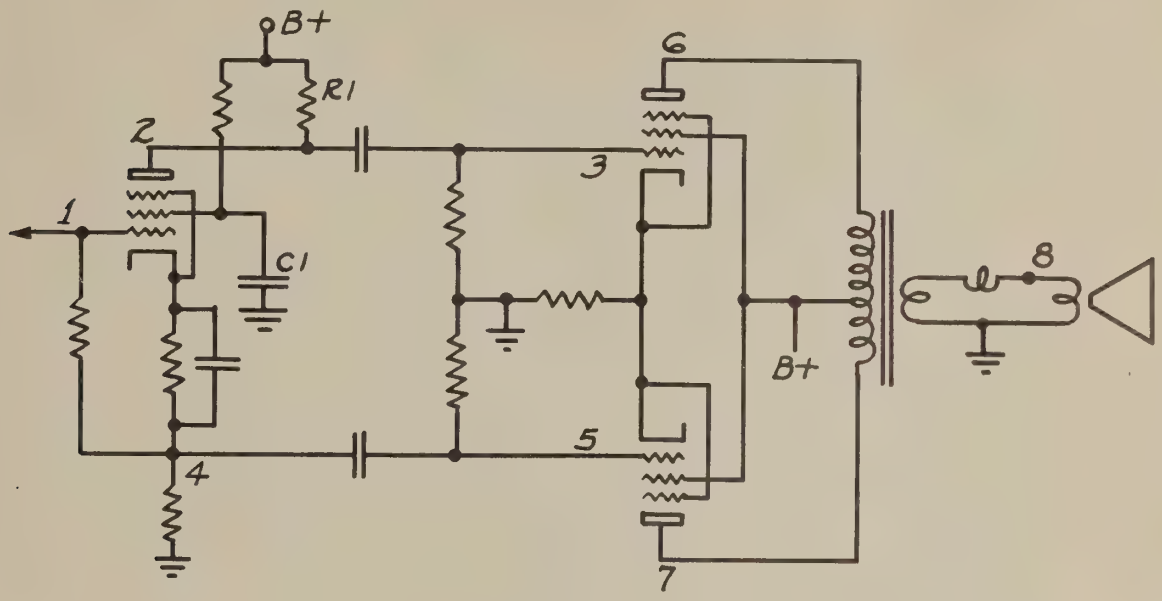


Figure 27

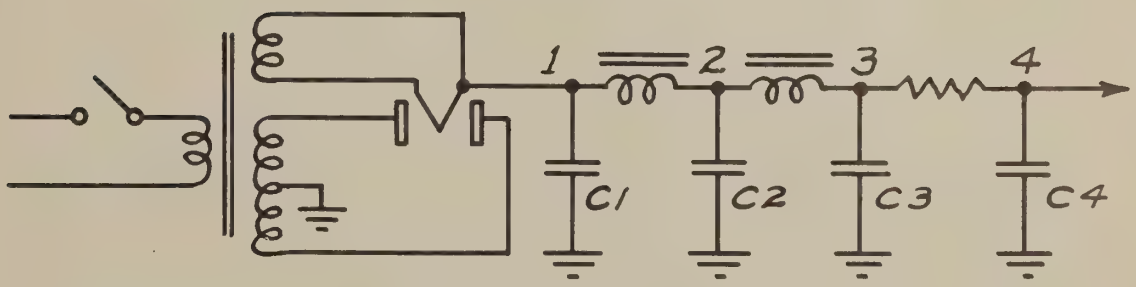


Figure 28

TESTING TUBE PHASE INVERTER CIRCUITS—A typical tube phase inverter is shown in Figure 27. If the phase inversion is operating properly, the signal voltages as indicated by the channel eye should be the same when the probe point is on either "2," "3," "4" or "5." Any appreciable variation in the signal level at any point calls for a check of components in that particular circuit.

The output circuit in Figure 27 is checked in the same manner as described above. The signal level at "6" and "7" in Figure 27 should be the same with alternate tubes removed from their sockets as described above.

the rear jack is in use, the channel eye does not indicate.

Since the cause of excessive hum is most likely to be found in the power supply circuit, it is best to start testing at its point of origin at "1" in Figure 28. At this point, the hum level should be highest and at all subsequent points in the filter circuits the hum level should decrease.

1. Place the AF probe on "1," and adjust the level control until the channel eye just closes or until a moderate hum level is heard in the phones

or shown on the oscillograph, depending on which method of observation is used.

2. When the probe is then moved to "2," the hum level should be lower. If not, check the filter condenser C2 and if necessary the choke between "1" and "2." An open condenser or a shorted choke would cause the trouble.

3. Continue testing until a point in the filter circuits is found where no appreciable reduction in hum occurs. Checking at that point will quickly locate the trouble.

It should be noted that the hum level in midget receivers is normally considerably higher than in console sets. In the former, the speaker and baffle are so small that a higher hum level is permissible since it will not be reproduced efficiently.

The preceding discussion covers the location of hum troubles in the main section of the power-supply high-voltage filter circuit. Hum which arises from defects in such filter systems is general throughout the receiver, and objectionable whether or not a signal is being received. A similar effect will result from defective or improperly-adjusted hum balancers in receivers employing filament-type tubes. Such devices, if used in the receiver under test, should, of course, be adjusted before proceeding with any tests. If adjustment does not affect the hum level, each hum balancer should be checked. This may be done with the AF Channel in the following manner:

1. Connect the Chanalyst ground clip to the center-tap or moving-arm of the hum balancer.

2. Place the a-f probe (green cable) on one of the two remaining terminals of the hum balancer. Observe the hum level as indicated on the channel eye.

3. Re-adjust the moving arm setting and note if the hum level changes. No change indicates a defective control. If a fixed center tap is employed, place the a-f probe on the other remaining terminal. If the hum level on each terminal is approximately one-half of the total hum voltage across the two terminals, the hum balancer is functioning properly; if not, it is defective.

The principal remaining causes of hum are listed below, with the proper methods of localizing them.

a. Tube defects. (Cathode leakage, shorted or open elements, etc.)

b. Poor ground connections.

c. Induction hum.

d. Shorted hum-bucking coils.

e. Power supply overloaded (due to shorts, etc.).

To localize such defects, follow routine test described under "SERVICING NOISY RECEIVERS." This applies to all defects mentioned above.

f. Carrier hum. Use RF-IF Channel, signal generator and *un-modulated* signal. Trace as for noise.

g. Leaky coupling condensers. Localize trouble with AF Channel following routine described under "NOISE." Check condenser with the Electronic Voltmeter as described in that section.

LOCALIZING DISTORTION—The output of a signal generator or a broadcast signal will be required to test for distortion; likewise phones or the cathode-ray oscillograph.

In using the oscillograph in conjunction with the Chanalyst for checking distortion it is desirable, but not essential, that the test signal be free from distortion. The test signal wave form should first be checked by plugging the oscillograph in the "RF-IF" channel output jack (on the rear of the unit), noting the character of the signal being applied to the receiver input.

This is our reference signal. If it is already distorted, any distorting circuit in the receiver will add more distortion and the wave form of the signal will be correspondingly changed. Components affecting the receiver performance at the point where this change in wave form is *first* noted should then be checked.

1. Adjust the "AF" level control for maximum sensitivity and place the AF probe (green cable) on "1" (Figure 25). Keep the signal generator output low to avoid overloading any stage under test. If distortion is noted at "1," check R1 and R2. An appreciable increase in resistance of either causes distortion. Also check the by-pass condenser and connections.

2. If there is no distortion at this point, place the probe on "2" and readjust the "AF" Channel level control until the same size image is present on the cathode ray tube screen. Distortion here may be caused by a shorted cathode by-pass condenser or an open grid resistor. If the cathode bias is shorted, the tube will draw grid current. This may be checked by placing the Electronic Voltmeter probe point on the control grid "2" and noting if a negative voltage is indicated when the signal is present, increasing as the signal is increased. Normally the voltage from grid to ground should read approximately zero.

3. Tests at other points in the signal path are made similarly, checking the circuit components at the point where the trouble is first noted.

The cathode-ray oscillograph will be found very useful in distortion tests with the Chanalyst because the probe system of testing removes the usual time-consuming operations that normally occur when attempting to use the oscillograph in the crowded sections of modern receiver chassis.

If headphones are used, distortion will be more easily detected when a broadcast signal, rather than a test oscillator, is employed for testing. Use a fairly strong signal but not so strong that overloading results. Check the signal level and adjust the "AF" level control, so the eye does not overlap, otherwise the AF Channel may be overloaded.

TESTING INVERSE FEEDBACK AMPLIFIERS—Testing complicated inverse feedback circuits is no more difficult than testing simpler designs. In Figure 29 a typical amplifier employing degenerative feedback from the plates of the RCA-6L6 output tubes to their input circuits is shown. In this circuit, testing first proceeds as for any push-pull transformer-coupled amplifier illustrated in Figure 26. If the inverse feedback circuit in Figure 29 is not working properly, the signal level at "3" will not be the same as that at Control setting. If there is an open circuit between "5" and "9," the signal at "8" will be stronger than at "7" and all other portions of the push-pull circuit will be unbalanced.

2. The same applies if there is an open circuit between "6" and "10." Then the signal at "7" will be stronger than the signal at "8" and again the entire push-pull circuit will be unbalanced. Short-circuits will correspondingly unbalance the push-pull circuits.

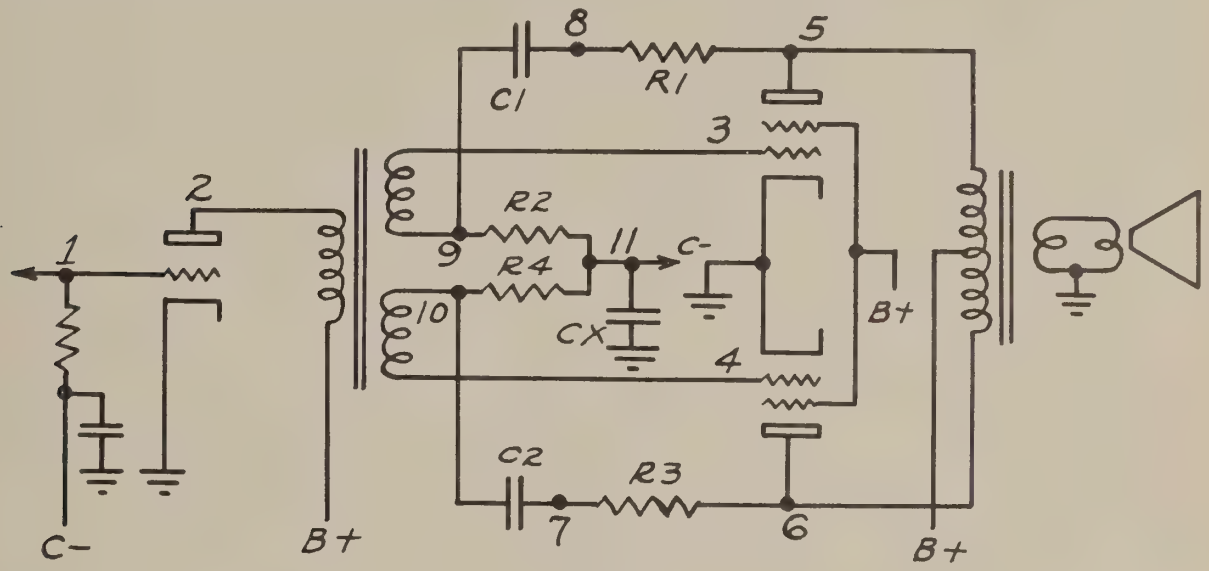


Figure 29

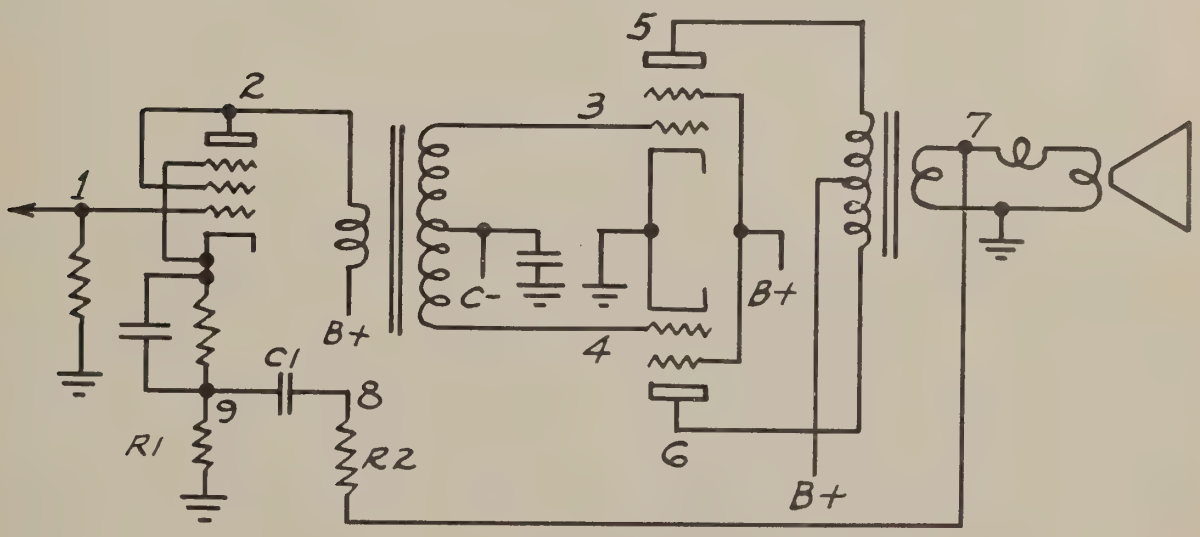


Figure 30

"4." Likewise, the signal level at "5" will not be the same as "6."

1. To isolate the trouble, compare the signal levels at "7" and "8." At either point the signal level should be lower than at "5" or "6" and both "7" and "8" should be at the same signal level, as indicated by the AF Channel eye and Level

An open circuit at "11" will not unbalance the circuit, but a strong signal at this point indicates that Cx is not effectively by-passing this point.

In Figure 30, the inverse feedback is from the voice coil at "7" through R2, C1 and R1. The signal will normally be present at "8" and "9" even though the inverse feedback network is not

functioning. If the signal is absent at "8," there may be an open circuit between "8" and "7" or "8" and "9" or R1 may be shorted. If the signal is absent at "9" we should check R1. If present at all points, unsolder the connection of C1 to "9." If the feedback network is functioning, the signal at "7" should then increase. If not, check each component in the network.

TESTING AUTO RADIO POWER SUPPLIES—Vibrator power supplies may be checked for noise, hum and hash filtering with the Chanalyst, as well as for other troubles.

A typical synchronous vibrator power supply system is shown in Figure 31. Before checking for noise, hum or hash, proceed as follows:

1. Place the Electronic Voltmeter probe (blue cable) at "6." If the voltage output is far below normal when the supply is connected to its normal load (as specified in the service manual for the receiver under test), remove the vibrator and check for short-circuits from "4," "5," and "6" to ground.

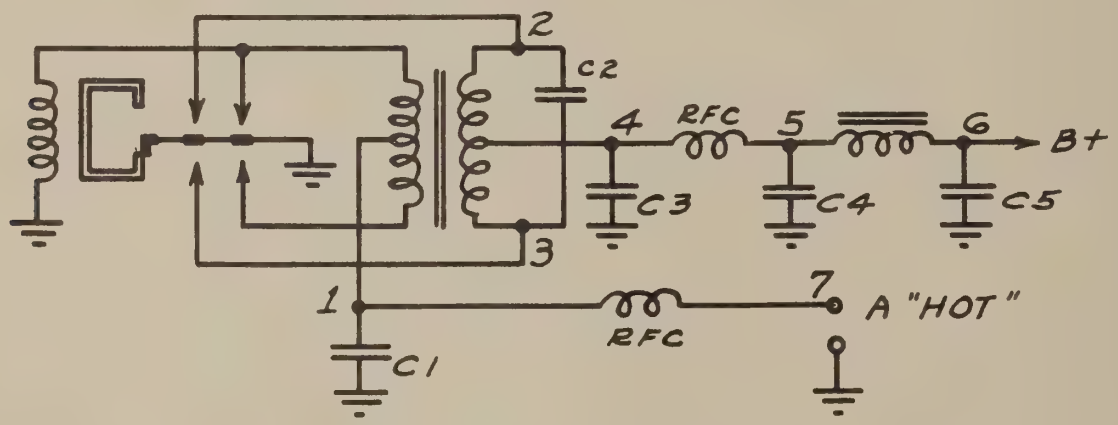


Figure 31

2. If no shorts are present, testing follows the usual routine as for a-c operated receivers. Place the AF probe (green cable) at "1" and note the hum level indicated on the channel eye and "AF" level control. Place the AF probe at "2." The hum voltage at this point should be much higher. If not, check the buffer condenser (C2) for a short; likewise, the vibrator transformer secondary.

3. Now measure the hum level at "3." It should be the same as at "2."

4. Place the probe on "4." The hum level should be much lower than at "3."

5. Place the probe at "5." At this point, the hum level should not change.

6. At "6" there should be very little hum indicated.

Hash or other noise which is picked up in the RF system is checked and localized with the RF-IF Channel. Proceed as follows:

1. Tune the channel to some point in the receiver operating range where the trouble is worst. Then place the rf-if probe at "1" and note the hash level (indicated by a fuzzy appearance on the channel eye, or by listening test on phones).

2. Next, place the probe at "7." The hash level should be lower if the RFC is functioning.

3. Compare the hash level at "4" and "5." It should be lower at "5" than at "4" if the r-f filter is operating properly.

Hash pick-up due to poor grounding of the audio-radio power supply may be detected by placing the RF-IF probe (red cable) on various parts of the car body, chassis, or engine and noting the hash level. A high hash level at any spot indicates inadequate grounding and additional bonding to that spot is needed.

The cathode-ray oscillograph may be employed for vibrator analysis, by plugging it in the "RF-IF" or "AF" jack. Follow manufacturers' instructions to determine vibrator troubles from the patterns.

CHECKING TONE CONTROLS AND FREQUENCY COMPENSATING CIRCUITS—Testing the operation of frequency compensating circuits or tone controls is accomplished quite simply by tracing the audio signal through the circuit.

In the frequency-compensating circuit shown in Figure 32, the audio signal level is first determined in the following manner:

1. Place the a-f probe (cable with green tracer) on "1" and adjust the "AF" level control until the channel eye just closes or to some other convenient reference point.

2. The signal should be present, but weaker, at "2" and "3" and absent at "4." An open circuit at "3" or "4" will cause a high signal level at "2," while a short circuit at either point will kill the signal.

While tone controls may be easily checked by a listening test, if the receiver is operating, it is sometimes desirable to know the condition of the

circuit when no speaker is at hand or when the speaker is defective. This may be determined as follows:

1. In Figure 33, place the a-f probe (green cable) on the moving arm of the tone control "1" and notice whether the audio signal strength changes as the position of the arm is varied. Noise or irregular action is indicated on the channel eye by flickering or abrupt changes in the shadow area. If phones are plugged in the audio channel, the condition of the control can be determined by a listening test.

CHECKING POOR GROUND CONNECTIONS—Defective ground connections are readily located by following the usual signal tracing procedure. When the cause of unsatisfactory performance has been localized to one particular stage, checking each component at the point where it connects to ground, will tell whether or not a poor ground connection exists. Referring to Figure 25, let us assume that an audio voltage is

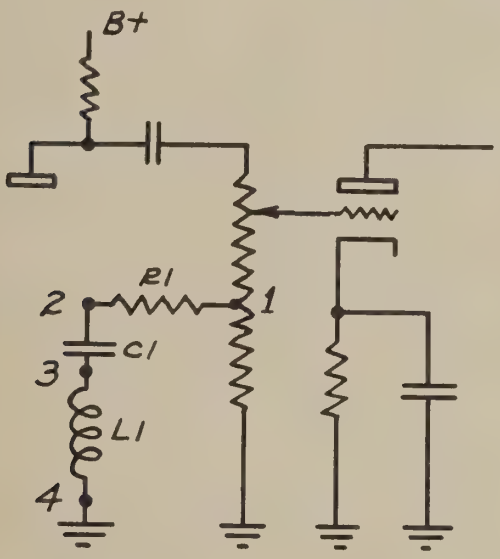


Figure 32

discovered at the point where C3 joins the cathode of the amplifier tube. If C3 were functioning properly, this audio signal should be by-passed to ground, and therefore, no signal (or a very weak one) should be present at this point. When a strong signal is present, the condenser C3 is not doing its job. Perhaps it is open; perhaps also the ground connection is open. In either case, C3 will not function. Place the AF probe (green cable) on the ground lead from C3. If the signal is present at this point, the condenser is not open; the ground connection is defective; therefore, the signal is not by-passed to ground.

USING THE AF CHANNEL AS A SEPARATE VOLTAGE AMPLIFIER—In checking low-level microphones, it may be found that the overall gain of the particular amplifier with which the microphone is employed is insufficient for full output. By plugging the microphone in the input jack of the AF Channel and connecting the output of the channel (from the jack in the rear) to the amplifier, the AF Channel becomes an excellent pre-amplifier. An additional stage of amplification with a gain of about 40 is added. The high input impedance of the AF Channel (about 2 megohms) adapts it for use with crystal microphones.

USING THE AF CHANNEL FOR CHECKING PHONOGRAPH PICK-UPS—Connect the Chanalyst ground lead and the a-f (green cable) probe to the pick-up terminals. Use a constant frequency record and the AF Channel Magic Eye to determine the output voltage of the pick-up. Use a regular record and crystal phones to check for pick-up distortion. The high input impedance of the AF Channel adapts it for checking either low-impedance (magnetic), or high-impedance (crystal) pick-ups.

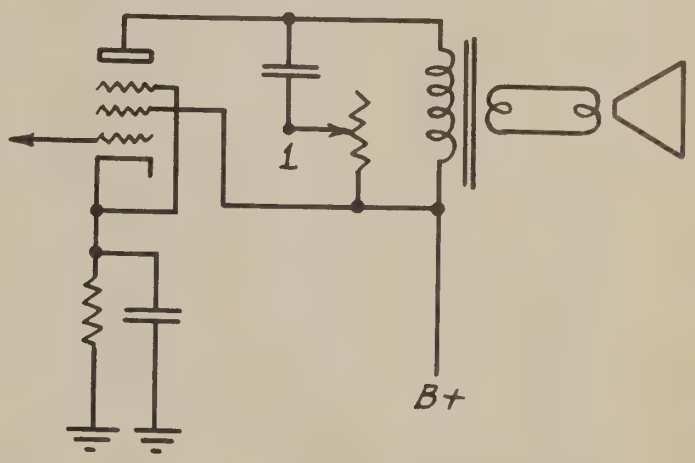


Figure 33

USING THE AF CHANNEL AS AN OUTPUT INDICATOR—The AF Channel makes an excellent output meter for aligning purposes, particularly for receivers without a.v.c. The ease and convenience with which it may be connected to any point in the audio system, combined with its high sensitivity, save time and give accurate results. To employ the channel for this purpose, proceed as described in the chapter on "ALIGNMENT PROCEDURE WITH THE CHANALYST."

LOCATING CAUSES OF AUDIO OSCILLATION—There are three common types of audio oscillation, namely:

1. Motor-boating, or intermittent blocking, caused by defective decoupling or filter circuits in the power supply, open grid circuits in ampli-

fying stages, or feedback due to improper placement of leads or components. To locate the cause of "MOTOR-BOATING" (when present with no applied signal) ground or short circuit the control grid of one of the audio tubes so that the trouble is no longer evident. Then check the power supply and decoupling circuits, following the routine described for locating open condensers. Open grid circuits are located by checking tube voltages with the Electronic Voltmeter.

2. Audio Howl: Located by employing the same routine described under heading, "SERVICING NOISY RECEIVERS."

3. Spurious Oscillation: Found especially in pentode and beam-power tube circuits. Check as for audio howl, but use the channel Magic Eye as indicator. When the AF probe (green cable) is placed on the grid or plate terminal of the affected tube, a high voltage output will be registered, even if the oscillations are of a frequency above audibility.

HOW TO OPERATE THE ELECTRONIC VOLTMETER

The Electronic Voltmeter is used to measure all d-c voltages in any portion of the radio receiver. The electrical zero is at center scale so voltage measurements of either positive or negative polarity can be made without interchanging voltmeter leads. This enables all measurements to be made with a single probe (blue cable) in conjunction with a common ground lead. The probe point is connected to a shielded cable (blue cable) through a one-megohm resistor enclosed within the probe handle. This resistor isolates the capacity and inductance of the cable from the probe point so that voltage measurements can be made in tuned amplifier or oscillating circuits without appreciable affecting their operation.

PRELIMINARY ADJUSTMENTS OF THE ELECTRONIC VOLTMETER—When the Chanalyst power switch is turned off, the Electronic Voltmeter pointer rests at the extreme left end of the scale. If it is below or above the scale limit, the mechanical zero adjuster located in the lower center of the meter case should be turned slightly until the pointer is precisely at the scale limit.

When the Chanalyst power switch is turned on, the meter pointer gradually rises to center scale. Then proceed as follows:

1. Insert the voltmeter cable plug (blue cable) in the Voltmeter jack (second from right on panel).

2. Place the voltmeter probe point against the panel and adjust the electrical zero knob control (marked "ZERO" at lower center of panel) until the meter pointer is precisely at center scale.

3. Connect the Chanalyst ground clip lead, at the rear of the Chanalyst, to the chassis of the receiver under test. If an ac-dc receiver, connect to the variable condenser rotor or other B— point. In some a-c operated receivers, C— is grounded. In all cases, voltages measured are potentials with respect to whichever point in the voltage supply system the clips is connected.

APPLICATIONS OF THE ELECTRONIC VOLTMETER—The design features of the Electronic Voltmeter greatly increase the scope of voltage measurements which now may be made in a radio receiver. With it, it is possible to measure accurately voltages in tuned or oscillating circuits, a.v.c. systems, high-resistance grid, plate and screen circuits as well as diode and bias cell potentials. The usual voltmeters heretofore used by servicemen are totally unsuited for such measurements.

It should be remembered, however, that voltage measurements are of secondary importance in trouble-shooting. Even though every voltage in every circuit is correct, a receiver may be inoperative. Coils may be short-circuited or badly mistuned; leads may be disarranged, condensers may be open, without changing receiver voltages.

The primary test of every receiver is to determine if each signal-carrying circuit is functioning properly. This is done with the RF-IF Oscillator and AF Channels. When tests with these channels indicate that any specific circuit is not performing as it should, measurements of voltages in that circuit either reveal the fault or eliminate one possible cause. For such measurements, we use the Electronic Voltmeter.

There are likewise conditions in a receiver which do not immediately affect the performance of tubes and circuits, but may lead to trouble at some early date. If voltages in a given circuit are higher than they should be, the operating life of some component may be shortened. In a normally-operating receiver, a single voltage measurement ordinarily will be sufficient to check all power-supply voltages. In Figure 34, for instance, a single measurement from "3" to ground, if normal, is sufficient. Any appreciable variation from normal voltages at other points would likewise affect the voltage at "3."

MEASURING POWER SUPPLY VOLTAGES—Before measuring the power-supply voltages in any a-c operated receiver, BE SURE TO CHECK THE RECEIVER POWER CONSUMPTION WITH THE WATTAGE INDICATOR. If the wattage reading is abnormally high (i. e., more than twice normal) or very low (less than one-half normal), an ohmmeter test rather than a voltage measurement should be made to locate the defective component.

Referring to Figure 34, which shows a typical receiver power supply circuit, voltages may be measured as follows:

1. Connect the Chanalyst ground clip to the receiver chassis.

2. Turn the electronic voltmeter "METER RANGE" switch to the 500-volt range.

3. Place the voltmeter probe (blue cable) on "1." The reading secured is the maximum voltage in the system. (No voltage at this point would be indicated by an abnormal wattage reading as described above.)

CHECKING TUBE VOLTAGES—With the Electronic Voltmeter voltages may be accurately measured directly at tube sockets, even though high resistances are in the circuit under test. The input resistance of the Voltmeter, 10,000,000 ohms, is so high in comparison with the resistance of most circuits in receivers, that negligible loading effect occurs.

Referring to Figure 36, voltages at the tube sockets are checked in the following manner:

1. With the Chanalyst ground clip connected to the receiver chassis, place the voltmeter probe (blue cable) on "1." The a.v.c. voltage applied to the control grid is then indicated.

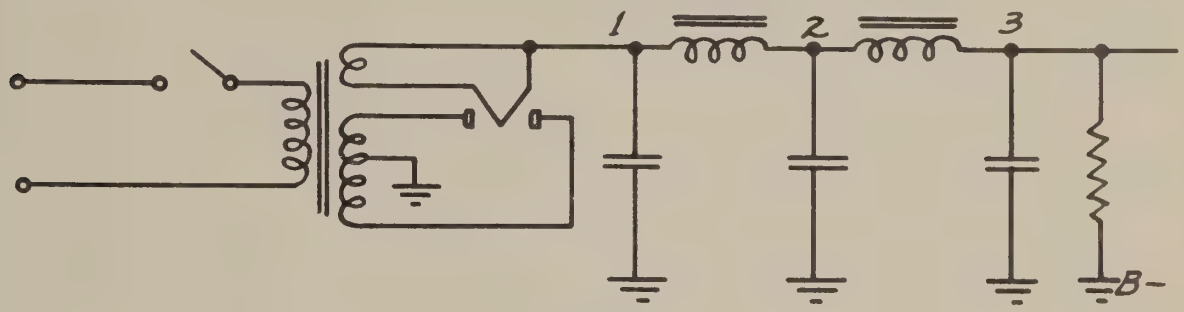


Figure 34

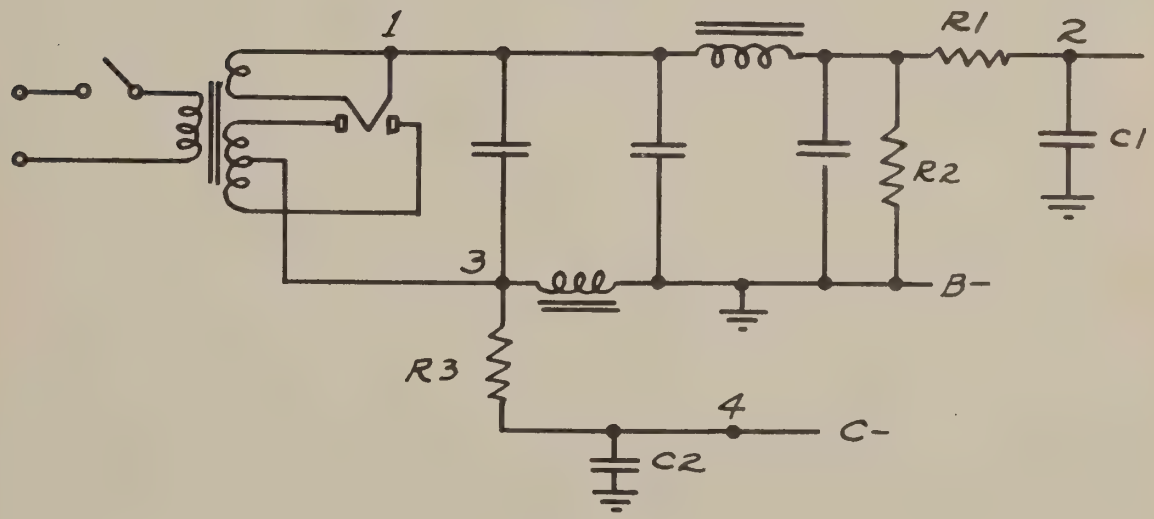


Figure 35

4. Place the Voltmeter probe on "2." The voltage at this point should be lower than at "1."

5. Place the probe on "3." The voltage at this point is commonly around 250, and represents an excellent single reference point for checking after all service operations have been completed.

In Figure 35, measurements are made in the same manner as described above. At "3" and "4," the voltages indicated will be negative, with respect to ground. The advantage of being able to read either negative or positive voltages without interchanging connections is thus apparent.

2. Place the Voltmeter probe on "2." The cathode voltage is then read. If the cathode resistor is open, the Electronic Voltmeter will show a *high* voltage at this point, because the plate and screen currents of the tube will then return to cathode through the voltmeter. If the cathode is shorted, no voltage will be indicated.

3. Turn the voltmeter "METER RANGE" switch to the 500-volt scale and place the voltmeter probe on "3." The plate voltage is then indicated. No voltage reading indicates either an open or short circuit.

4. With the "METER RANGE" at "500," place the Voltmeter (blue cable) probe on "4." The screen voltage is then indicated. No voltage reading indicates either an open or a short circuit. In some tubes, a very low voltage reading may also indicate an open circuit.

Suppressor grids in r-f pentodes are normally connected to ground or cathode, though in some receiver a.v.c. voltage is applied to the suppressor as well as the control grids. An open connection to ground will be indicated by a voltage reading when the probe point is placed on the suppressor grid, if other tube elements receive proper voltages, since some electron current will then flow through the meter.

tunes from a strong to a weak station, though a large change in a.v.c. voltage may result.

Let us assume that this a.v.c. system is defective though the receiver is otherwise normal. Then there will be a large increase in loudspeaker volume when tuning from a weak to a strong station or vice versa. Perhaps the a.v.c. voltage is being applied to some but not to all controlled tubes. With the receiver in operation and tuned to a strong signal, proceed as follows:

1. Check the receiver schematic and locate the tubes which are under a.v.c. control.

2. Place the Electronic Voltmeter probe (blue cable) on "1." A reading of more than —1.0 volt, depending on the signal strength, should be indi-

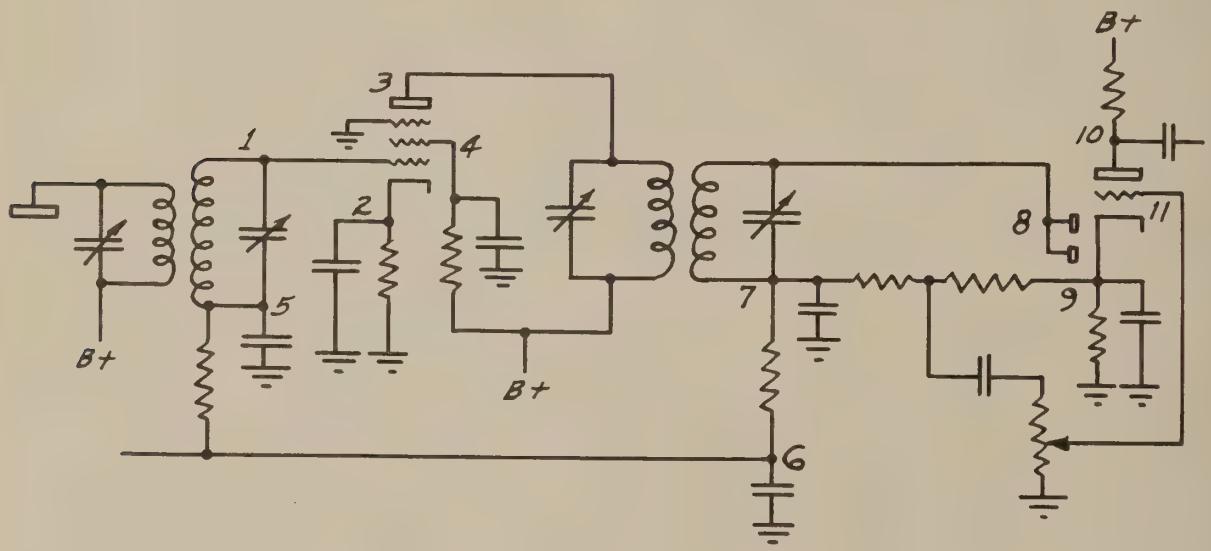


Figure 36

MEASURING A.V.C. VOLTAGES—With the Electronic Voltmeter, a.v.c. voltages may be measured accurately at any point in the system, even at the grids of controlled tubes.

A typical circuit showing a diode detector and a.v.c. system controlling a single preceding stage is illustrated in Figure 36. In the diode detector circuit, some current normally flows even when no signal is being received. This current causes a small negative voltage to be developed across the diode load. This is called the diode "CONTACT POTENTIAL," and causes the diode plate to be from 0.5 to 1.0 volt negative with respect to its cathode. When a signal is applied to the diode circuit, an increase in current flow results, causing a similar increase in this negative voltage. This voltage is used to control the amplification of one or more preceding stages in the receiver. When this system is operating normally, there will be little change in loudspeaker volume when one

cated. Only one controlled stage is shown in Figure 36; if the receiver under test has several such stages, each should be checked. This test may be made very quickly, since the probe is placed directly on the easily-accessible control grids.

3. If there is no a.v.c. voltage at *any* of the grids tested, place the voltmeter probe on "7," the point in the detector circuit where the a.v.c. voltage should first appear. If no a.v.c. voltage is present, check components and connections at this point. If a.v.c. voltage is present, continue testing.

4. Place the probe on "6." This is the only remaining point in the a.v.c. system which is common to all a.v.c.-controlled tubes, therefore, the trouble should be located at this point.

If one tube receives a.v.c. voltage while others do not, simply test at points connecting to the main a.v.c. bus and the grid filter circuit.

TESTING OSCILLATOR OPERATION—A quick and positive test of oscillator operation may be made with the Electronic Voltmeter. "Dead spots" in any portion of the oscillator's normal operating range, as well as the relative strength of the oscillations, are quickly indicated.

A typical oscillator circuit is shown in Figure 37. To test, proceed as follows:

1. With the Chanalyst ground clip connected to the receiver chassis, turn the voltmeter "METER RANGE" switch to "5."

2. Place the voltmeter probe on "1." If the tube is oscillating, a *negative* voltage will be indicated. If the tube is *not* oscillating, the voltage reading will be zero or positive.

3. Rotate the oscillator tuning condenser over the entire bands. Any change in voltage reading indicates a change in the strength of oscillation. In most receivers, the variation in voltage reading will be approximately 2 to 1.

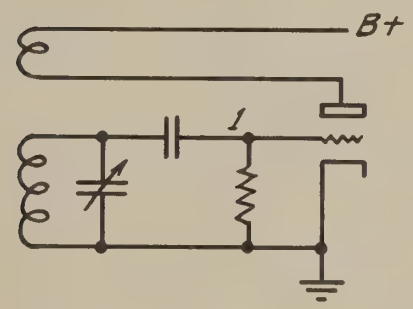


Figure 37

TESTING FOR LEAKY COUPLING CONDENSERS—Leakage in coupling condensers in audio circuits can be detected with the Electronic Voltmeter.

Figure 38 shows a typical two-stage resistance-coupled amplifier. To check the coupling condenser, C2, for excessive leakage, proceed as follows:

1. With the Chanalyst Ground Clip connected to the receiver chassis, turn the Voltmeter Range Switch to "5."

2. Place the Voltmeter probe (blue cable) on "4." The voltage reading should be zero. If C2 is leaky, a portion of the plate voltage at "3" will be impressed on "4." The voltmeter will then indicate a *positive* voltage.

CHECKING GASSY TUBES—Grid current, particularly in power tubes, is often a cause of unsatisfactory receiver performance. Often this trouble is not indicated by tube checkers, either because it is not present at the moment of test or because the operating voltages in the receiver are different from those used in the tube checker.

With the Electronic Voltmeter, a simple test under actual receiver operating conditions will quickly reveal the trouble.

Referring again to Figure 38, the test is made in precisely the same manner as for leaky coupling condensers. If tube grid current is caused by gas, a *positive* voltage will be indicated by the Electronic Voltmeter.

A small positive voltage (less than 1 volt) is occasionally indicated even when the tube is normal, particularly when the grid resistor is high. When grid current is sufficiently high to cause trouble, however, a reading of several volts will be indicated.

Often several minutes operation are required before this trouble appears. In such cases, the probe

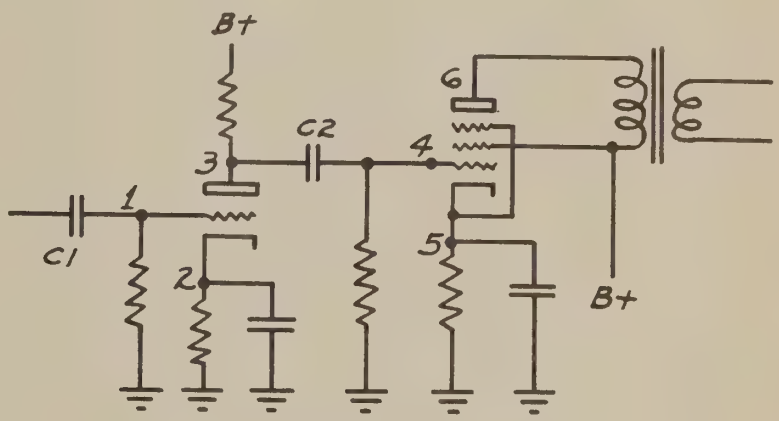


Figure 38

clip may be screwed on the probe point and a semi-permanent connection made to "4" until the receiver trouble occurs. Then a reading of the Electronic Voltmeter will show whether or not the trouble is caused by grid current in the tube under test. Make the reading when no signal is being received by the set.

CHECKING FOR OVERLOAD DISTORTION—Overload distortion, caused by an excessively strong signal being applied to an amplifier tube grid, is indicated in the same manner as described above. When the peak signal voltage exceeds the grid bias, the grid draws current and a negative voltage is indicated at "4," due to rectification.

Since the grid bias on each tube in Figure 38 is dependent on the cathode voltage, if a tube draws grid current with a small applied signal, the cathode voltage should always be checked. A shorted cathode resistor will cause the grid to draw current with little or no applied signal.

HOW TO OPERATE THE WATTAGE INDICATOR

The first step in testing any *A-C operated* receiver is to check its power consumption. This is done with the wattage indicator.

OPERATION OF THE WATTAGE INDICATOR—To operate the wattage indicator, proceed as follows:

1. Insert the receiver power plug in the receptacle at the rear of the Chanalyst.

2. Plug the Chanalyst power cord to any 105-125 volt, 60 cycle outlet and switch on both the receiver and the Chanalyst. The wattage indicator circuit is so designed that either the Chanalyst or the receiver may be turned off independently.

3. After the tubes in the receiver have heated, adjust the "WATTS" level control knob (top right of panel) until the "WATTS" Magic Eye (second from right on panel) just closes. The approximate wattage consumption of the receiver is then indicated by the position of the "WATTS" level control pointer on the wattage calibration scale. This calibration is based on an average power factor of 80 percent, representative of most power transformers in radio receivers. The accuracy of this calibration is more than adequate for the purpose intended but is not a precision measurement of watts.

The wattage rating of radio receivers may deviate as much as 10 percent of the actual consumption which varies with line voltage and manufacturing tolerances. Therefore a precision measurement of wattage is of slight value. The principal function of the Wattmeter channel is to reveal CHANGE of wattage on an intermittent receiver where there is an intermittent open- or short-circuit in the "B" supply or heater circuits. If the wattmeter Magic Eye does not change when the intermittent occurs, it is assurance that the intermittent defect is not in the power supply parts.

FOR AC-DC RECEIVERS—Proceed as described above and note the wattage reading and:

1. Reverse the receiver plug in the Chanalyst receptacle and note the new reading. The wattage indicated will be either higher or lower than that of the first reading.

2. Take the average of the two readings so obtained. This represents the approximate wattage consumption of the receiver. For example, if the first reading were 32 and the second 44 watts, the average is 38 watts.

SUPPLEMENTARY INSTRUCTIONS — The wattage rating of many receivers is given on the chassis identification plate or in the service notes. If not, it can be roughly approximated from the following table:

AC-DC sets	(single power tube)	40 to 70	watts
AC-DC "	(two power tubes) .	50 to 100	"
A-C "	(single power tube)	50 to 100	"
A-C "	(two power tubes) .	100 to 200	"

Keep watch on the "WATTS" Magic Eye when the receiver is first turned on. As the tubes warm, the eye will start to close. Then turn the "WATTS" level control knob until it points to the approximate power consumption of the receiver. If the eye overlaps even when you have turned far beyond this point, turn off the set immediately and check for a short-circuit from the rectifier cathode or filament to B minus or ground. If no short is apparent, remove the rectifier tube and turn on the receiver once more. If it still draws excessive current, there may be an internal short in the power transformer or in the wiring to the rectifier or other tubes. This should be checked until the trouble is located.

If the power consumption is much lower than expected, shut off the set and check for an open circuit in the same manner as described above. When the trouble has been located and corrected, the normal procedure of signal tracing may be followed to locate performance defects.

Two flexible insulated leads so arranged that they may be screwed on the probe tips are supplied with each Chanalyst. One of these may be connected to the Electronic Voltmeter (blue cable) probe, thus enabling a voltage measurement to be made simultaneously with that of power consumption. This is done by inserting the end of the flexible wire in a filament or cathode socket of the rectifier tube. The tube is first removed, the wire inserted and the tube replaced thereby making a tight connection. The voltmeter "METER RANGE" swtich should be turned to the 500 volt scale. Then, by observing the wattage Indicator and voltmeter reading, the power supply voltage and receiver power consumption are obtained as soon as the receiver is turned on.

ALIGNMENT PROCEDURE WITH THE CHANALYST

For those who so desire, the Chanalyst can be used for broadcast band receiver alignment without the usual necessity for rocking the gang condenser at the low-frequency end of the range. On short-wave bands, the oscillator operating frequency is definitely established and the danger of aligning to the image frequency is thus avoided.

Four channels are employed for alignment purposes, namely:

1. The RF-IF Channel; by connecting its probe (red cable) to the mixer plate, the r-f and mixer input condensers may be aligned, independently of the receiver oscillator. Also, the oscillator operating frequency, up to 1700 kc, may be determined.

2. The Oscillator Channel; the oscillator operating frequency, up to 15 megacycles, can be checked and adjusted.

3. The Electronic Voltmeter; proper alignment in the r-f and i-f systems is indicated when the a.v.c. voltage is greatest. This is measured with the Electronic Voltmeter. Use the probe with the blue cable.

4. The AF Channel; this can be used as a highly-sensitive output indicator in any portion of the a-f system for alignment of receivers not equipped with a.v.c.

ALIGNING SUPERHETERODYNES (WITH A.V.C. CONTROL)—In aligning receivers with a.v.c., either a modulated or unmodulated signal may be employed. The latter is preferable, since some test oscillators provide a broad signal when modulator is used. Proceed as follows:

1. Place the receiver, Chanalyst, and a test oscillator in operation.

2. Make the receiver oscillator tuning condenser inoperative by connecting a clip lead from stator to rotor.

3. Connect the test oscillator to the input terminals of the receiver and tune it to 1400 kc. (Or whatever alignment frequency is specified by the manufacturer for high-frequency adjustment.)

4. With the receiver in operation, turn the tuning knob until the exact alignment frequency is indicated on the dial.

5. Place the rf-if probe (red cable) on the receiver antenna post and tune the RF-IF Channel to resonance with the test oscillator.

6. Now clip the rf-if probe on the mixer socket grid terminal.

7. Adjust the receiver gang condenser r-f and mixer input trimmers until a maximum r-f voltage is indicated by the RF-IF Channel at the mixer grid.

8. Adjust the RF-IF Channel to the intermediate frequency specified by the receiver manufacturer and clip its probe to the mixer socket plate terminal.

9. Now remove the shorting wire across the set oscillator tuning condenser, and, without retuning the receiver, adjust the oscillator trimmer condenser until a maximum i-f voltage is indicated by the RF-IF Channel.

10. Tune the test oscillator, the RF-IF Channel and the receiver to 600 kc.

11. Make the receiver oscillator tuning condenser inoperative (see operation 2).

12. With the rf-if probe (red cable) still connected to the mixer plate, re-tune the receiver until the 600-kc signal voltage is a maximum, as indicated by the RF-IF Channel.

13. Remove the shorting wire from the oscillator tuning condenser, tune the RF-IF Channel to the i-f prescribed by the receiver manufacturer and adjust the oscillator padder condenser until the i-f signal is a maximum.

14. Since the adjustment of the oscillator padder at 600 kc will change slightly the preliminary 1400-kc adjustment, again tune the test oscillator and the receiver to 1400 kc. Using a weak test signal, re-adjust the oscillator trimmer condenser until the i-f signal at the mixer plate is a maximum.

The r-f alignment is now complete. To align the i-f section, continue as follows:

15. Move the RF-IF probe (red cable) to the first i-f plate and adjust the first i-f transformer trimmers until the channel indicates a maximum i-f signal. Reduce the test oscillator signal while making this adjustment, using just sufficient signal to note the effect of trimmer adjustments.

16. Repeat this procedure for the next i-f stage, moving the RF-IF Channel probe to the second detector diode if there is but one i-f stage. Continue reducing the signal voltage as the i-f stages are brought into alignment. If one or more broadband i-f transformers are employed, shunt a 20,000-ohm resistor across the secondary before adjusting the primary trimmer. After the primary has been adjusted, put the shunting resistor across the primary and adjust the secondary for maximum output.

If desired, the IF amplifier may be aligned first, using the Chanalyst as an output indicator or using the cathode ray method, and then the RF amplifier may be aligned in accordance with operations 1 to 14 inclusive above.

ALIGNING SUPERHETERODYNES (WITHOUT A.V.C.)—The procedure described above applies likewise to receivers without a.v.c.

CHECKING TRACKING ON SHORT-WAVE BANDS—The Oscillator Channel is employed to determine the operating frequency of the receiver oscillator. Tracking on short-wave bands can thus be checked. Follow the manufacturer's instructions for aligning, then check the oscillator frequency as follows:

1. Tune in a signal of known frequency at the high-frequency end of the band.

2. Measure the receiver oscillator frequency (as described in the Oscillator Channel section).

3. Note if this frequency is higher or lower than the signal frequency. In most receivers the oscillator frequency should be higher. If not, it is so specified in receiver service notes.

4. Repeat above procedure for the low-frequency end of the band. The receiver oscillator frequency should bear the same relation to the signal at both ends of the band. That is, if it is higher in frequency at one end of the band, it should likewise be higher in frequency at the low-frequency end of the band.

Note that the final adjustment of the oscillator should follow in accordance with conventional alignment procedure.

ALIGNING TUNED R-F RECEIVERS—The conventional alignment procedure can be followed, using the AF Channel as a sensitive output indicator. The a-f probe (green cable) may be connected at any convenient point in the a-f system when the signal is present.

ALIGNING A.F.C. CIRCUITS—Complicated a.f.c. discriminator tube circuits may be rapidly and accurately aligned with the Electronic Voltmeter.

A typical a.f.c. discriminator circuit is shown in Figure 39. To align, proceed as follows:

1. With the a.f.c. switch off, tune the receiver to a strong signal.
2. Turn on the a.f.c. switch.
3. Connect the Chanalyst ground clip to ground.
4. Place the Voltmeter probe (blue cable) on "2."
5. Adjust the trimmer condenser on the primary of the discriminator transformer until a maximum voltage reading is indicated at "2."
6. Place the Voltmeter probe on "3."
7. Adjust the discriminator transformer secondary trimmer until the voltage reading at "3" is zero. In some circuits, zero voltage will not be obtained; for these circuits, adjust the secondary trimmer so that no change in voltage is obtained when the signal input is reduced to zero.

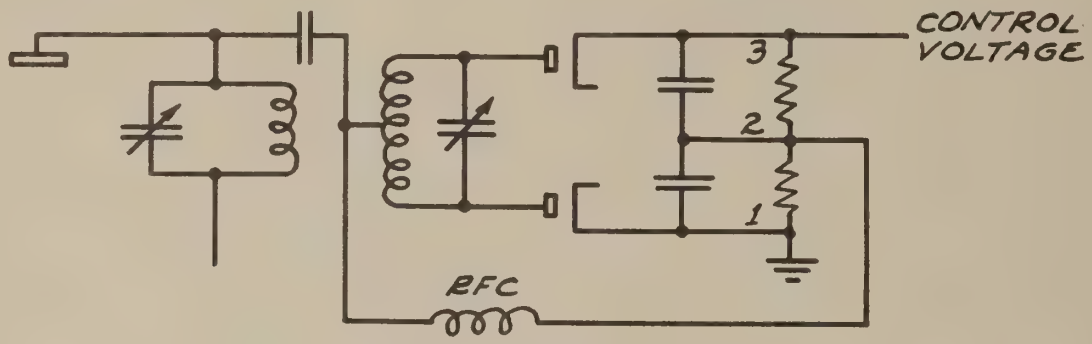


Figure 39

SERVICING INTERMITTENT RECEIVERS

Unquestionably one of the most difficult and exasperating problems which faces the radio service industry is the servicing of intermittent receivers. When such a receiver "CUTS-OUT," the minute electrical charge resulting from touching a test probe to any portion of the receiver will often restore operation for an indefinite period. Even less unstable receivers, which "FADE" slowly, are likely to return temporarily to normal if voltage measurements are attempted. And often the cause of such troubles does not affect receiver voltages. IN EVERY CASE, HOWEVER, THE SIGNAL IS AFFECTED, and with the Chanalyst, the particular circuits in which the signal level changes are promptly identified without disturbing the set components. The test probes are connected to key points in the receiver circuits, the level controls are adjusted to give a predetermined indication on Magic Eyes of the various channels. Then, when the receiver becomes intermittent, a glance at the Magic Eyes tells which receiver circuits are affected and the trouble is localized. Finding the defect is thus greatly simplified.

A block diagram of a typical superheterodyne receiver is shown in Figure 40.

The circuit includes an r-f stage, mixer, i-f, detector and two a-f stages.

To test such a receiver, we divide the circuit into five major sections and monitor the operation of each one. To do this, proceed as follows:

1. Plug the receiver in the "TEST WATTS" receptacle and adjust the "WATTS" indicator level control until the Magic Eye just closes.
2. Connect a signal generator to the input of the receiver and feed a modulated signal of approximately 600 kc to the receiver.
3. Screw on the clips provided for each probe tip. This enables the probes to be fastened to any circuit which it is desired to test.
4. Clip the RF-IF Channel probe (red cable) on the stator lug of the variable condenser which tunes the mixer input circuit.
5. Similarly, connect the Oscillator channel probe (brown cable) to the receiver oscillator tuning condenser.
6. Connect the AF Channel probe (green cable) to the plate or control grid terminal of the first a-f tube.
7. Connect the Electronic Voltmeter (blue cable) to the a.v.c. bus (or to the control grid of any tube) receiving a.v.c. voltage.
8. Tune the receiver to resonance with the signal. Tune the RF-IF and Oscillator Channels

to resonance with the circuits to which they are connected. Adjust the Level Controls on each channel until each Magic Eye just closes. Note the a.v.c. voltage indicated on the Electronic Voltmeter.

We assume that the set is operating normally after these preliminary monitoring adjustments and connections have been made. Since the signal level in each part of the receiver is now monitored, any change in the operating condition of the receiver will be indicated by a change in the signal level of the stages or circuits affected.

lator Channel. Since the r-f stages are not affected, the rf-if indicator Magic Eye will not change. However, since the signal level in all other portions of the receiver is reduced, the indications will change accordingly.

When the r-f section is controlled by the a.v.c. circuit, the r-f indicator will overlap because failure of the oscillator reduces the a.v.c. voltage.

INTERMITTENT OPERATION IN THE IF STAGES—In case the source of intermittent operation is due to some defect in the i-f stages, the

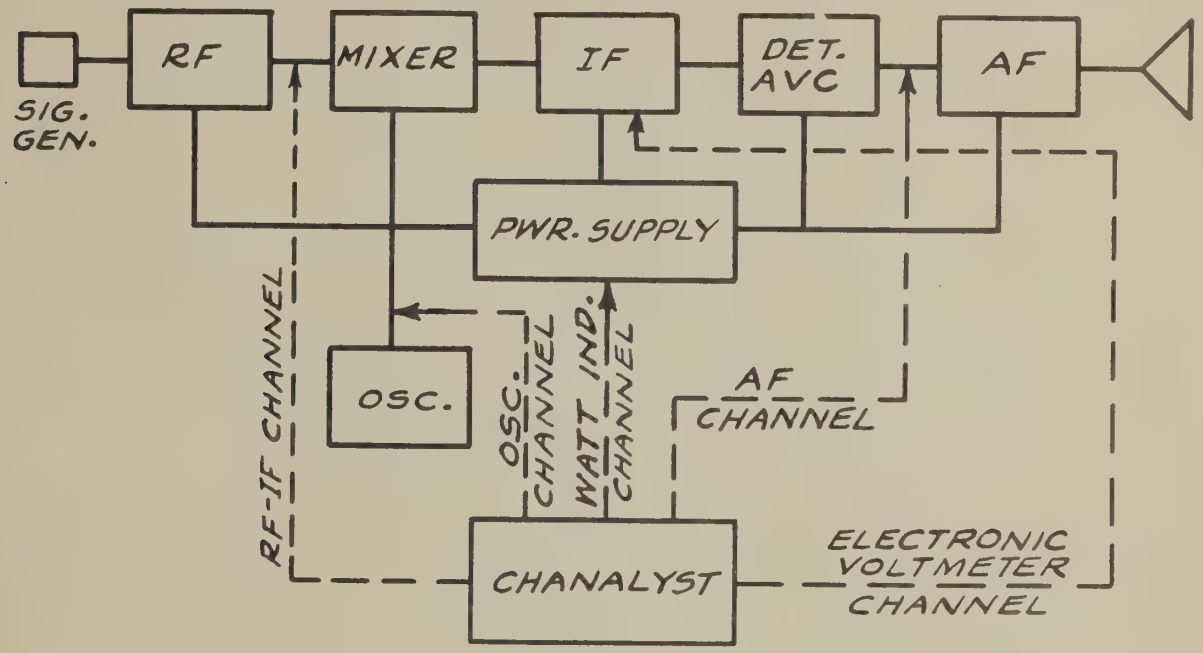


Figure 40

INTERMITTENT OPERATION OF THE RF SECTION—If the cause of intermittent reception is in some circuit ahead of the mixer tube, the following changes in the Chanalyst Magic Eye will take place:

1. The RF-IF Channel Magic Eye will open, since the r-f signal at the mixer will be reduced.

2. The AF Channel Magic Eye will likewise open, since the a-f signal will also be weaker.

3. The a.v.c. voltage as indicated by the Electronic Voltmeter will change or, if the defect is of such nature that the power consumption of the receiver is appreciably changed, it will be registered on the "WATTS" indicator Magic Eye. If a short-circuit has occurred, the eye will overlap. If a voltage supply circuit has opened, the eye will likewise open. Minor changes in power consumption are not indicated by the eye.

INTERMITTENT OSCILLATOR OPERATION—If the source of trouble is in the oscillator circuit, whether caused by oscillator drift, intermittent operation or irregular output, the defect will be indicated on the Magic Eye of the Oscil-

a.v.c. voltage will be decreased causing an increase in signal gain in the r-f stages. The "RF-IF" Channel Magic Eye will accordingly overlap. The "OSC." Channel Magic Eye will not change; the "AF" Channel Magic Eye will open; the "WATTS" indicator Magic Eye will change as described above if the receiver voltages are appreciably affected.

INTERMITTENT OPERATION IN THE DETECTOR OR AF SYSTEM—When the cause of the intermittent operation is the result of some trouble in the detector or first a-f stage, the "AF" Channel Magic Eye will be affected. The indications of the "OSC." channel eye, Electronic Voltmeter and the RF-IF Channel Magic Eye will not be changed unless the defect is of such nature that voltages throughout the receiver are appreciable altered. In such cases, the "WATTS" indicator Channel Magic Eye will likewise change thus indicating the nature of the trouble.

If the intermittent operation is such that a long period of time elapses before the receiver fades, it is sometimes more convenient to use a broadcast signal than a test oscillator signal. If this is done,

the AF Channel attenuator should be set so that the "AF" Magic Eye just closes on modulation peaks.

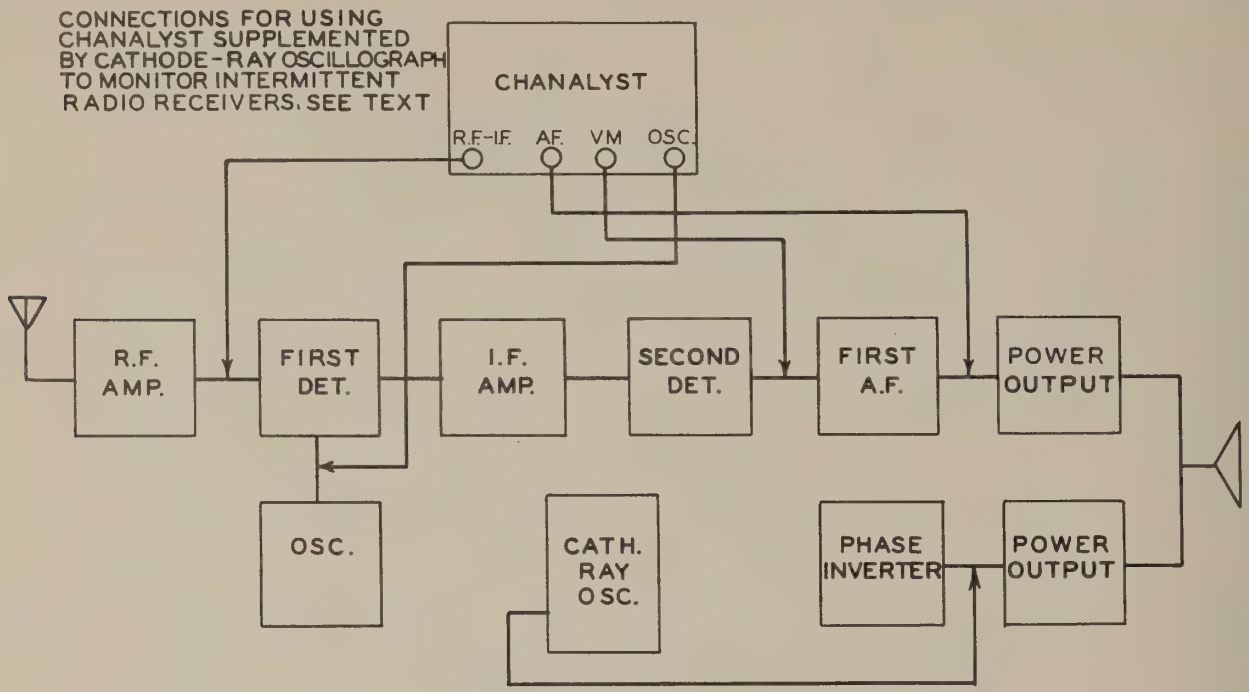


Figure 41

TO USE THE CHANALYST SUPPLEMENTED BY A CATHODE-RAY OSCILLOGRAPH TO MONITOR AN INTERMITTENT RECEIVER— In the block diagram, Figure 41, the Chanalyst is shown as used in conjunction with a cathode-ray oscillograph to monitor intermittent radio receivers. As will be evident from inspection of this drawing every section of the receiver is covered by a channel of the Chanalyst or by the cathode-ray oscillograph, while the output is monitored by the receiver speaker. In this manner the defective section of the receiver may be quickly located.

HIGH-SPEED TROUBLE-SHOOTING WITH THE CHANALYST

In the foregoing chapters, the manner in which the Chanalyst functions has been described in considerable detail and many of the almost limitless applications of the instrument in radio servicing have been outlined. If every receiver were subjected to the entire signal-tracing routine, and the defective conditions thus revealed were corrected, the quality of workmanship in nearly all service shops would be immeasureably improved. Though this routine takes but a few moments (merely the time required to move the probe from point to point and readjust controls) even greater speed is possible when one is entirely familiar with the operation of the Chanalyst and the receiver under test.

In giving estimates, for instance, one would not proceed to correct each receiver fault as it is revealed by signal-tracing tests. Then, the cause of one specific receiver trouble is required. In such cases, the test procedure can be further simplified.

Set troubles, other than intermittent operation, may be divided into five groups, namely:

1. No reception.
2. Weak reception.
3. Noisy reception.
4. Excessive hum.
5. Distorted reception.

The location of such specific troubles can be speedily determined by tests which embrace whole sections of the receiver, rather than individual stages. The procedure follows:

1. No reception. Feed a strong signal to the receiver. With the Electronic Voltmeter (use the blue cable probe) check the a.v.c. voltage. If a.v.c. voltage is absent, the trouble is in the power-supply or in some portion of the receiver ahead of the second detector.

2. If there is no a.v.c. voltage and the power-supply voltages are correct, check r-f signal at mixer grid. Use the RF-IF Channel and red cable probe. If the signal is absent, the trouble is in the mixer or in the r-f stage. If signal is present, the trouble is in the oscillator or the i-f stage.

3. Check oscillator with Oscillator (brown cable probe) or RF-IF Channel (red cable probe). If operating properly, the trouble is in i-f stages.

The foregoing shows how quickly such troubles may be localized. It is assumed, of course, that the Wattage Indicator test has shown normal power consumption. If the receiver is equipped with a.v.c. check signal at "1" antenna post, "2" at mixer grid, "3" at second detector, "4" first a-f plate. If, at any of these points, the signal is absent, test stage by stage including points where signal was last found. If signal is present at all points, trouble is in the output stage.

WEAK RECEPTION—Check a.v.c. voltage with Electronic Voltmeter, as in "1" above. If subnormal, check power-supply voltage. If a.v.c. voltage is normal, trouble is in the a-f system. If not, and power-supply voltage is OK, check level at mixer grid. If OK, check oscillator. Follow with i-f gain check to locate trouble. For receivers without a.v.c., check signal level at mixer grid, second detector, and first a-f plate. Low gain between any two points indicates trouble in the receiver section last tested. Normal gain indicates trouble in output stage.

NOISY RECEPTION—Use headphones or oscillograph. Check (without signal) for noise at mixer grid. If absent, check at last i-f grid, following, if necessary, to first a-f and speaker voice coil. Trouble is located at point where noise is first noted or between that point and the last previous test point.

EXCESSIVE HUM — Check power-supply; check at last i-f stage as for noise; check first a-f stage.

MODULATION HUM—Check for hum on the supply voltages to all elements of all tubes. Use the AF Channel of the Chanalyst with headphones or a cathode-ray oscillograph on its output.

DISTORTED RECEPTION—Check as for noisy reception.

ENGINEERING APPLICATIONS

The flexibility and speed of the Chanalyst makes it unusually valuable in development work on radio receivers and other electronic apparatus.

In addition to its normal application for fast location of "bugs" in experimental models, it provides rapid checks on engineering features, such as—

SELECTIVITY

Image attenuation.
Adjacent-channel attentuation.
I-F Attenuation.

EXTRANEOUS SIGNALS

I-F in audio input circuit.
Second harmonic of i-f in r-f input circuits.
Harmonics of heterodyne oscillator in r-f input circuits.
Hum and audio modulation at plus B points.

TRACKING

Tracking of r-f stages.
Tracking of r-f and oscillator.

ATTENUATION

Attentuation of r-f traps and filters.
Attenuation of a-f traps and filters.
Attenuation of transmission lines.

GAIN

Gain of r-f, i-f and a-f transformers.
Gain of r-f, i-f, and a-f tubes.

MISCELLANEOUS

Automatic volume control action.
Modulation distortion.
Hum modulation.
Distortion through entire circuit.
Dead-spots in tuned circuits.

USING THE CHANALYST AS A UNIVERSAL LINK—An extremely valuable application of the Chanalyst, particularly in the communication field, is its use as a universal r-f, i-f, or a-f link. For example, if the i-f amplifier unit in a receiving system goes dead, the RF-IF channel may be tuned to this particular intermediate frequency and "patched" across the input and output terminals of the defective unit to permit uninterrupted service.

USING THE RCA SIGNALYST IN CONJUNCTION WITH THE CHANALYST—The RCA Signalyst is designed as a companion piece for the Chanalyst. The Signalyst is a modern signal generator with metered output in microvolts. It is accurately calibrated and covers the extremely wide frequency range of 100 kilocycles to 120,000 kilocycles (0.1 megacycle to 120 megacycles) which includes the bands assigned to frequency-modulation and television.

The Signalyst and Chanalyst make an unbeatable combination for radio service and engineering.

AVERAGE GAIN-PER-STAGE VALUES

The figures on gain-per-stage listed below are based on the assumption that the receiver a.v.c. system is not operating. A.V.C. action will reduce considerably the r-f, mixer, and i-f stage gains. For comparison purposes, a weak signal should be used, or the a.v.c. circuit temporarily shorted out.

In the a-f section, for resistance-coupled amplifier, the lower gain figures represent average gains for ac-dc receivers while the higher gains apply to a-c operated receivers.

RADIO-FREQUENCY SECTION—

Antenna to grid of first tube	1.5	to 10
Antenna to grid of first tube (auto-radios)	15	to 50
R-F Amplifier	2	to 40

MIXER SECTION—

Converter grid to i-f grid (1 stage i-f amp.)	30 to 60
Converter grid to i-f grid (2 stage i-f amp.)	5 to 20

INTERMEDIATE-FREQUENCY AMPLIFIER SECTION—

I-F stage (1 stage i-f amp.)	40 to 150
I-F stage (2 stage i-f amp.)	5 to 20

BIASED DETECTOR—Types 57, 6C6, 6J7—A 1.0 volt r-m-s signal (20 percent mod.) at the grid will produce approximately 10 volts r-m-s of a-f at the plate.

AUDIO-FREQUENCY SECTION—

RCA-75, 2A6	40 to 55
RCA-6F5	40 to 55
RCA-6Q7	30 to 45
RCA-6N7, 6C8 (each section)	20 to 25
RCA-2B7, 6B7, 6B8	50 to 80
RCA-6F6, 2A5, 47 (grid-to-plate)	10 to 20
Triode output tubes	2 to 5

A.V.C. VOLTAGE—A.V.C. voltage may run as high as 40 volts, depending upon the strength of the input signal and the number of tubes under control. In general, the greater the number of tubes controlled the lower the a.v.c. voltage for a given input signal.

MAINTENANCE

While extraordinary care has been taken in the manufacture and test of the RCA-Rider Chanalyst and each instrument is laboratory tested under strict engineering supervision, in the course of use it is possible that the instrument may require checking and servicing.

REPLACEMENT OF TUBES—The Chanalyst is so designed that the calibration of the various controls and the performance of the instrument are essentially independent of changes in the tubes. Tubes may be replaced in the RF-IF, Oscillator, AF and Voltmeter Channels without the necessity

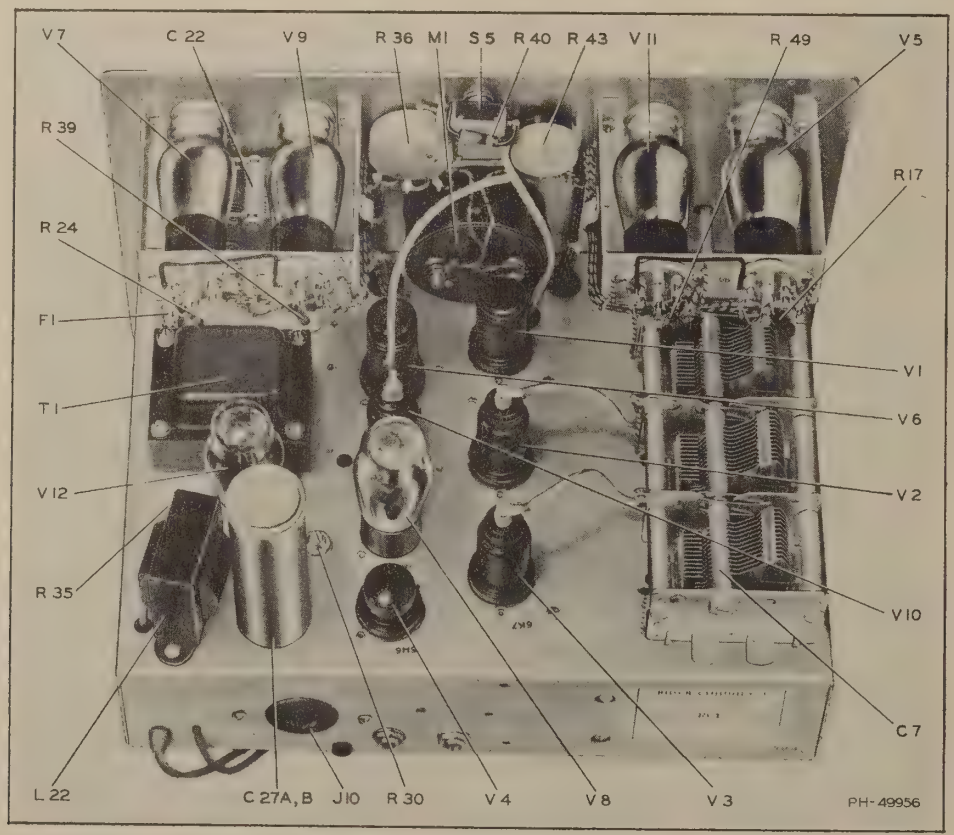


Figure 42

Component parts of the Chanalyst are indicated by symbol number in Figure 1, schematic wiring diagram and, in the photographs, Figures 42, a top view of the chassis with case removed and Figure 43, a sub-chassis view of the unit.

for any adjustments. However, when the Magic Eye in the Wattage Indicator Channel is replaced, it is desirable to carry out the following adjustment, which compensates for variations in the Magic Eye characteristics.

With the line voltage at an average value (about 118 volts), plug a receiver into the "TEST WATTS" receptacle of the Chanalyst. This receiver should be in good operating condition, and its power consumption should be determined from the serial plate on the chassis or measured with a wattmeter, if the latter is available. The power consumption of the receiver should preferably be from 75 to 100 watts. The Chanalyst wattage indicator control on the front panel should then be set so as to indicate the correct power consumption of the receiver. The adjustment is complete when the wattage indicator calibration adjustment (the 500,00 ohm control mounted at the extreme right in the chassis is set so that the Magic Eye has just closed).

Receiving signals at the correct setting of the dial scale depends upon having the proper relation between tuning condenser setting and dial scale. The dial pointer should be set to the low frequency end of any band.

TEST OSCILLATOR CONNECTIONS—When aligning the RF-IF Channel or the Oscillator Channel, a test oscillator should be used as the signal source and connection should be made via the "RF-IF" input jack or the "OSC." input jack, as the case may be. The output of the channel under adjustment should be read on its respective Magic Eye.

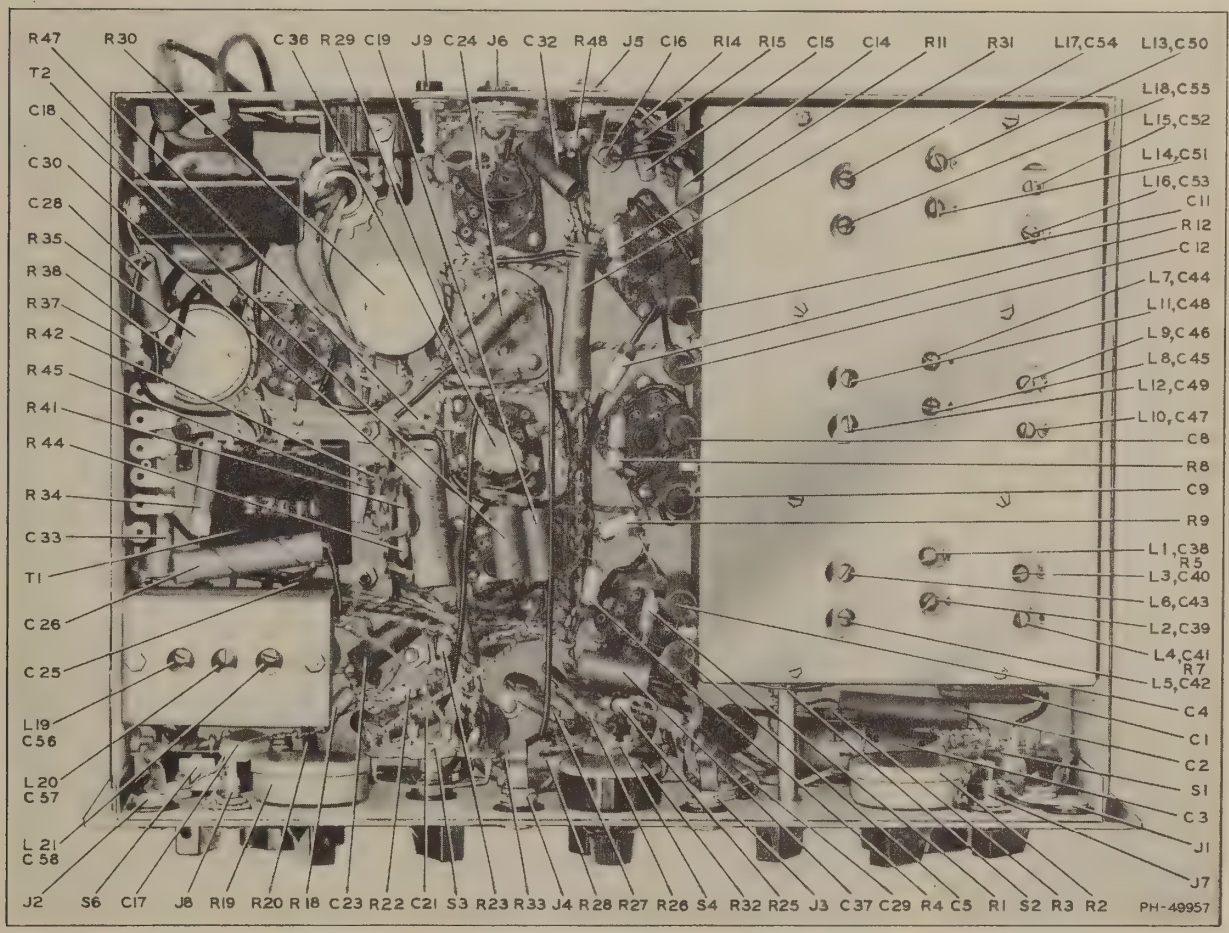


Figure 43

TO CHECK THE ELECTRONIC VOLTMETER—With the two meters connected in parallel, compare readings obtained with the Electronic Voltmeter, at various points in a radio set with the readings obtained at the same points with a standard d-c voltmeter (1,000 ohms per volt) of known accuracy.

ALIGNMENT OF THE CHANALYST—Should it become necessary to align the Chanalyst, proceed as follows:

TRIMMER CONDENSERS—The slotted adjustment screws of the trimmers are accessible in the base of the Chanalyst upon removal of the chassis from its case. These trimmers are identified in the schematic wiring diagram, Figure 1 and in Figure 43, a sub-chassis view of the unit.

It is important to note the C38, C40 and C42, C44, C46 and C48, C50, C52 and C54 in the various stages of the RF-IF Channel are series coupling trimmers. Increasing the capacity of these trimmers (by turning the screw clockwise) increases the sensitivity; but, if the capacity is increased too much, the stage will oscillate. If the

adjustment has resulted in oscillation, the adjustment screw should be backed off (counter-clockwise) from the point where oscillation occurs. C39, C41 and C43; C45, C47 and C49; C51, C53 and C55 are parallel-connected trimmers. The trimmers of the Oscillator Channel are C56, C57 and C58.

When aligning the RF-IF Channel, begin with the RF stage preceding the diode and work toward the input jack.

TO CHECK THE CALIBRATION OF THE RF-IF CHANNEL OF THE CHANALYST—A piezo-electric calibrator, such as the RCA Stock No. 9572, may be used to check the calibration of the dial of the RF-IF Channel of the Chanalyst. When the RCA Calibrator is used, the rf-if probe should be placed in contact with the "HI-LO" switch of the calibrator. The "RF-IF" Magic Eye of the Chanalyst should then respond at the fundamental frequencies (either 100 or 1000 kilocycles—depending on the setting of the "HI-LO" switch) and the harmonics thereof.

RACK-AND-PANEL MOUNTING OF THE CHANALYST—If it is desired to install the Chanalyst on a shelf or rack, the "RF-IF" and "AF" output jacks and the wattage receptacle may be wired to an extension panel by following the diagram, Figure 44.

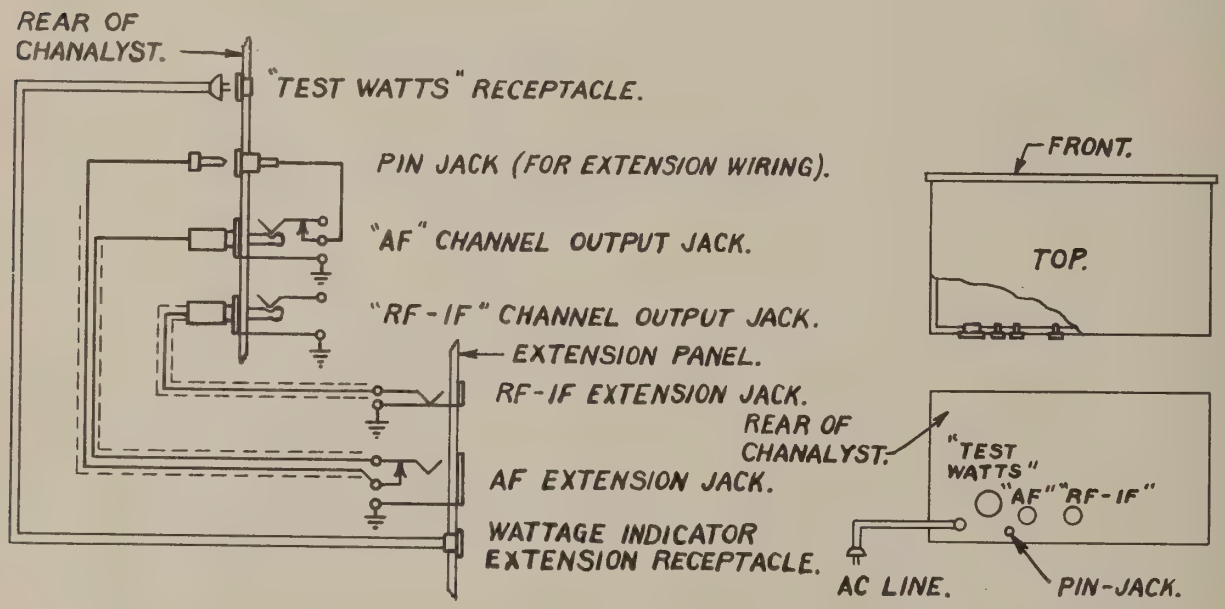


Figure 44

PARTS LIST

Item	Description	Serial No. 3500-Up Stock No.	Serial No. 1-3500 Stock No.
C-1	Capacitor—1,500 mmfd.	13762	
C-2	Capacitor—0.015 mfd.	11315	
C-3	Capacitor—0.15 mfd.	35261	
C-4, C-5, C-6	Capacitor—0.01 mfd.	4839	
C-7	Variable Condenser	35272	
C-8, C-9, C-10, C-11, C-12, C-13	Capacitor—Same as C-4		
C-14	Capacitor—1,000 mmfd.	12635	
C-15	Capacitor—220 mmfd.	12694	
C-16	Capacitor—0.01 mfd.	14393	
C-17	Capacitor—100 mmfd.	12720	
C-18, C-19	Capacitor—Same as C-16		
C-20	Capacitor—Same as C-4		
C-21	Capacitor—Same as C-16		
C-22	Variable Condenser	35271	
C-23	Capacitor—Same as C-16		
C-24	Capacitor—Same as C-14		
C-25, C-26	Capacitor—0.05 mfd.	32787	
C-27A, C-27B	Capacitor—(25 cycles only)	35295	
C-27A, C-27B	Capacitor—(60 cycles only)	35278	
C-28, C-29	Capacitor—Same as C-16		
C-30	Capacitor—20 mfd.	34965	
C-31, C-32	Capacitor—Same as C-16		
C-33	Capacitor—Same as C-25		
C-34			
C-35			
C-36	Capacitor—Same as C-17		
C-37	Capacitor—Same as C-16		
F-1	Fuse—1 ampere	14133	
J-1, J-2, J-3, J-4, J-5	Jack	23421	
J-6	Jack	4924	
J-7, J-8, J-9	Tip Jack	35275	35699
L-1, L-2	Coil Assembly A—Band	35291	35702
L-3. L-4	Coil Assembly B—Band	35290	35703
L-5, L-6	Coil Assembly C—Band	35292	35704
L-7, L-8	Coil Assembly—Same as L-1		
L-9, L-10	Coil Assembly—Same as L-3		
L-11, L-12	Coil Assembly—Same as L-5		
L-13, L-14	Coil Assembly—Same as L-1		
L-15, L-16	Coil Assembly—Same as L-3		
L-17, L-18	Coil Assembly—Same as L-5		
L-19, L-20, L-21	Coil Assembly	35289	
L-22	Reactor	35270	
M-1	Meter (When ordering replacement meter for instruments below serial 3500, order meter, Stock No. 35277, and dial scale, Stock No. 35698)	35277	
R-1	Resistor—270,000 ohms, ½ watt	30651	
R-2	Resistor—Variable 9,000 ohms	35282	
R-3	Resistor—330 ohms, ½ watt	8063	
R-4	Resistor—100,000 ohms, ½ watt	3252	
R-5	Resistor—3,900 ohms, ½ watt	30694	
R-6	Resistor—1,500 ohms, ½ watt	30654	
R-7	Resistor—Same as R-4		
R-8	Resistor—Same as R-3		
R-9	Resistor—Same as R-4		
R-10	Resistor—Same as R-6		
R-11	Resistor—Same as R-3		
R-12	Resistor—Same as R-4		
R-13	Resistor—Same as R-6		
R-14, R-15	Resistor—470,000 ohms, ½ watt	30648	
R-16	Resistor—2.2 megohms, ½ watt	30649	
R-17	Resistor—1 megohm, ½ watt	30652	
R-18	Resistor—Same as R-4		
R-19	Resistor—Same as R-2		
R-20	Resistor—200 ohms, ½ watt	3581	
R-21	Resistor—75,000 ohms, ½ watt	35256	
R-22	Resistor—470,000 ohms, ½ watt	30648	
R-23	Resistor—Same as R-16		
R-24	Resistor—Same as R-17		
R-25	Resistor—7.5 megohm (matched pair)	35260	
R-26	Resistor—2.0 megohm (matched pair)	35259	35700
R-27	Resistor—400,000 ohms (matched pair)	35258	35701
R-28	Resistor—100,000 ohms (matched pair)	35257	
R-29	Resistor—6,200 ohms, ½ watt	35255	
R-30	Resistor—Variable 2,000 ohms	35281	
R-31	Resistor—27,000 ohms, 2 watts	14167	
R-32	Resistor—Variable 10,000 ohms	35283	
R-33	Resistor—Same as R-29		
R-34	Resistor—1,900 ohms, 1 watt	35254	
R-35	Resistor—Variable, ½ megohm	35285	
R-36	Resistor—Variable, 17,000 ohms	35284	
R-37	Resistor—Same as R-14		
R-38	Resistor—Same as R-16		
R-39	Resistor—Same as R-17		
R-40	Resistor—2 megohms, ½ watt	34257	
R-41	Resistor—20,000 ohms, ½ watt	6240	
R-42	Resistor—Same as R-21		
R-43	Resistor—Variable, 2 megohms	35286	
R-44	Resistor—Same as R-41		
R-45, R-46	Resistor—Same as R-1		
R-47	Resistor—Same as R-16		
R-48, R-49, R-50	Resistor—Same as R-17		
S-1	Switch	35274	
S-2	Switch—RF-IF Range switch wafer (3 req'd)	36178	

PARTS LIST—Continued

Item	Description	Serial No. 3500-Up Stock No.	Serial No. 1-3500 Stock No.	Item	Description	Serial No. 3500-Up Stock No.	Serial No. 1-3500 Stock No.
S-3	Switch	35273			Cable Assembly (Voltmeter Test) (Blue)	35265	
S-4	Switch—Same as S-1				Cable Assembly (Osc. Test) (Brown)	35266	
S-5	Switch	2034			Flexible Connector	35710	
S-6	Switch	35287			Fuse Board Assembly	13210	
T-1	Power Transformer—(25 to 40 cycle only)	35294			Knob Assembly ("RF-IF") ("OSC.")	35288	
T-1	Power Transformer—(50 to 60 cycle only)	35268			Knob (Small Bar Knob)	7960	
T-2	Transformer	35269			Knob ("ZERO")	4323	
	MISCELLANEOUS				Power Cord	14086	
	Clip	35262			Plug Receptacle	35293	
	Clip Attachment Assembly	35267			Shaft—RF-IF range switch shaft detent	36179	
	Cable Assembly (A-F Test) (Green)	35263			Tube Socket (octal)	31251	
	Cable Assembly (RF-IF Test) (Red)	35264			Tube Socket (5 prong)	35279	
					Tube Socket (6 prong)	35280	

Note: When ordering replacement parts please give the serial number of your Chanalyst.

GUARANTEE

The RCA-Rider Chanalyst is guaranteed for a period of one year in accordance with the terms expressed on the Guarantee Card accompanying each instrument.

THE FIRST REAL SIGNAL GENERATOR

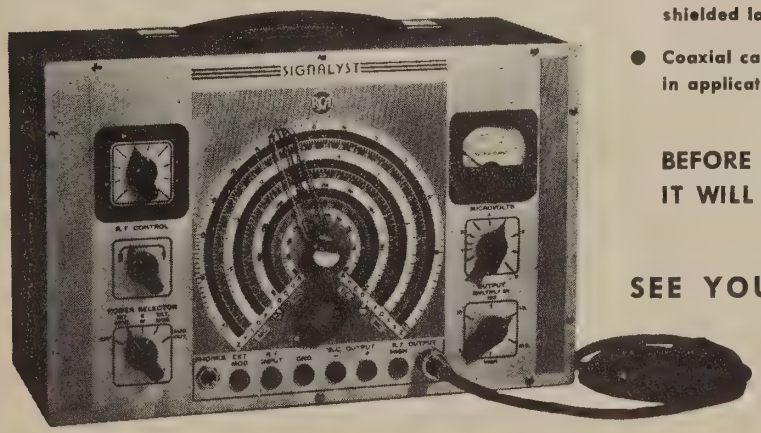
For the Service Field

THE RCA SIGNALYST

The modern signal generator that gives you a stable signal source for practically any receiver—broadcast, short-wave, or commercial—with maximum efficiency.

The Signalyst embodies all the features you've ever wanted. A metered signal of known value that gives reliable assistance when you trace the signal from its very source. Unmatched range—accuracy—and stability because it provides *all frequencies in fundamentals* . . . a feature heretofore never included in an instrument in this price bracket.

RCA's answer to your signal generator needs—both present and future—is The Signalyst. Unbeatable for present day service work—it's a MUST for Television. Its wide frequency range insures minimized obsolescence.



SOME FEATURES THAT INSURE PERFORMANCE PLUS

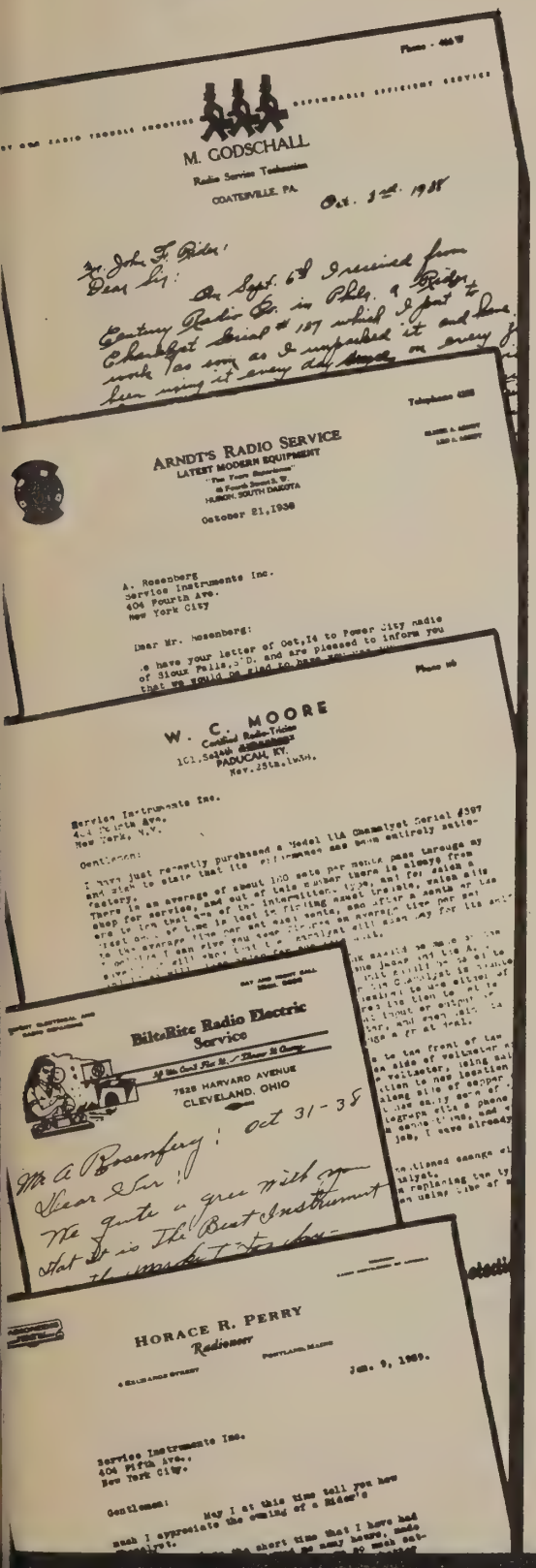
- **Range 100 kc.—120 mc. in fundamental frequencies covered by TEN bands.**
- **Circuits aligned at each end of each band to within 0.05% accuracy provide total dial calibration accuracy better than 1%.**
- **Self-contained heterodyne detector permits direct calibration to external signal, such as provided by RCA Crystal Calibrators, within the frequency range of the instrument.**
- **Large diameter dial scales at the higher frequencies. Knife edge pointer for no parallax reading.**
- **Metered output controlled by specially developed shielded ladder-type attenuator.**
- **Coaxial cable output for minimum leakage and ease in application.**

BEFORE YOU BUY ANY TEST OSCILLATOR IT WILL PAY YOU TO INVESTIGATE THE RCA SIGNALYST.

SEE YOUR DISTRIBUTOR *today!*

RCA

Read WHAT THESE SERVICEMEN Say



REAL SPEED

An average of about 180 sets per month pass through my shop for service and out of this number one to ten are of the intermittent type, on which a great deal of time is lost in finding the exact trouble. This of course adds to the average time per set each month. I believe I can give you some figures on average time per set saved after a month or two that will show that the Chanalyst will soon pay for itself. If this is so, I will place my order for one more unit.

W. C. Moore
Paducah, Ky.

SAVED MANY HOURS

In the short time I have had the Chanalyst, it has saved me many hours, made my work so much easier, and given me so much satisfaction in knowing that I can turn out better work in so much shorter time.

My first job with the Chanalyst was a set with dead audio; the AF probe quickly located the exact spot. The next set had distortion and the RF-IF probe located an open by-pass condenser in the first i-f circuit. Next was an intermittent set that the Wattage Indicator pointed out the trouble in the primary of the power transformer and a resoldering of several joints fixed that.

You sure have a wonderful instrument and you can count on me as a booster.

Horace R. Perry
Portland, Me.

ANSWER TO SERVICEMAN'S PRAYER

The Chanalyst we purchased from your representative has been busy almost continually since we have had it. We feel that it is the answer to a serviceman's prayer. We have found many new uses for it that were not taken up at the demonstration which we attended. It has no respect for the age of the set on which it is used —— whether it is ten years old or ten days.

The Chanalyst has changed that head-ache job to a pleasure. The use of the Chanalyst on one such job should sell any up-and-coming serviceman on the possibility of this equipment. I can assure you that we will always be on the lookout for any equipment that your company may bring out in the future, if it has the versatility of the Chanalyst.

Leo A. Arndt
Huron, S. D.

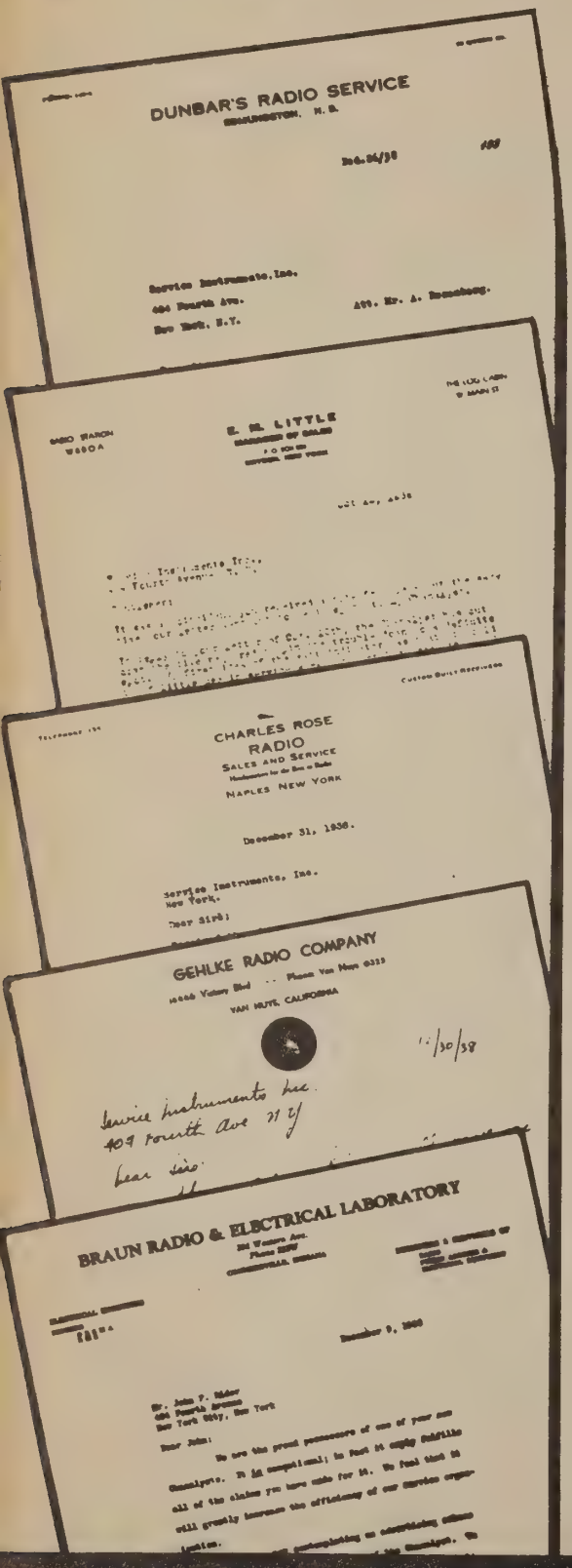
BEST INSTRUMENT ON THE MARKET

The Chanalyst is the best instrument on the market today. We have had some experience with it on the new receivers and it worked wonderfully.

Bilt-Rite Radio Elec. Serv.
Cleveland, O.

The RIDER Chanalyst

Proved IN THE HANDS OF SERVICEMEN



AMPLY FULFILLS ALL CLAIMS

We are the proud possessors of one of your new Chanalysts. It is sensational; in fact, it amply fulfills all of the claims you have made for it. We feel that it will greatly increase the efficiency of our service organization.

We have already begun our preliminary advertising campaign and we intend to use a picture of the Chanalyst and a description of the instrument in our advertising later on.

The Chanalyst does perform —— in fact, it has made itself an essential part of our laboratory equipment in the period that we have had it.

V. J. Braun, Manager
Braun Radio Electrical Lab.
Connersville, Ind.

NO PRAISE TOO GREAT

In the short time we have had the Chanalyst it has proven itself to be a complete service instrument that is opening a path to better and quicker radio servicing. The value of such a piece of service equipment is not fully appreciated until you have seen the usual grief jobs come and go with the same ease as the normal run of repair jobs. There is no praise too great for the Chanalyst.

Don Gehlke
Gehlke Radio Co.
Van Nuys, Cal.

WORKS MIRACLES IN FINDING INTERMITTENTS

I think the Chanalyst is the biggest help to the radio serviceman that has ever been placed on the market. It certainly works miracles in finding intermittent troubles. It greatly reduces the time required to find any kind of trouble no matter how obscure it may be.

William Dunbar
Dunbar's Radio Service
Edmundston, N. B., Canada

CHANALYST IS A HONEY

Let me tell you that the Chanalyst sure is a honey. It helped me crack one of the toughest intermittent sets I've ever worked on. This set sure was tough. The Chanalyst should be on every serviceman's work bench. Those who haven't one don't know what they're missing.

Charles Rose
Naples, N. Y.

The RIDER Chanalyst

SERVICEMEN CONTINUE TO *Praise*

AMAZED AT THE POSSIBILITIES

While I was well sold on the Chanalyst from the first, having placed my order sixty days before even seeing one, I was amazed at the possibilities after using it for awhile and seldom a day passes that I do not discover a new short cut in servicing. I am sincere when I say that I believe the Chanalyst is destined to become an essential to the modern service shop.

E. S. Courter
Iola, Kans.

POSITIVE RECEIVER IS RIGHT AFTER REPAIR

I am the fortunate owner of a Chanalyst and it is all and even more than you claim. I make this statement, not only from the angle of speed and ease with which troubles may be located, but rather because it affords a means of being absolutely positive that a receiver is right after repair. We rubber-stamp every set on which we use the Chanalyst and point out the fact to the owner, which has tended to make our customers feel greater confidence in our work. I can only wonder how the industry got along so long without such an instrument.

Ray Pentecost
Metropolitan Radio Service
Chicago, Ill.

HAVE DONE "IMPOSSIBLE" JOBS

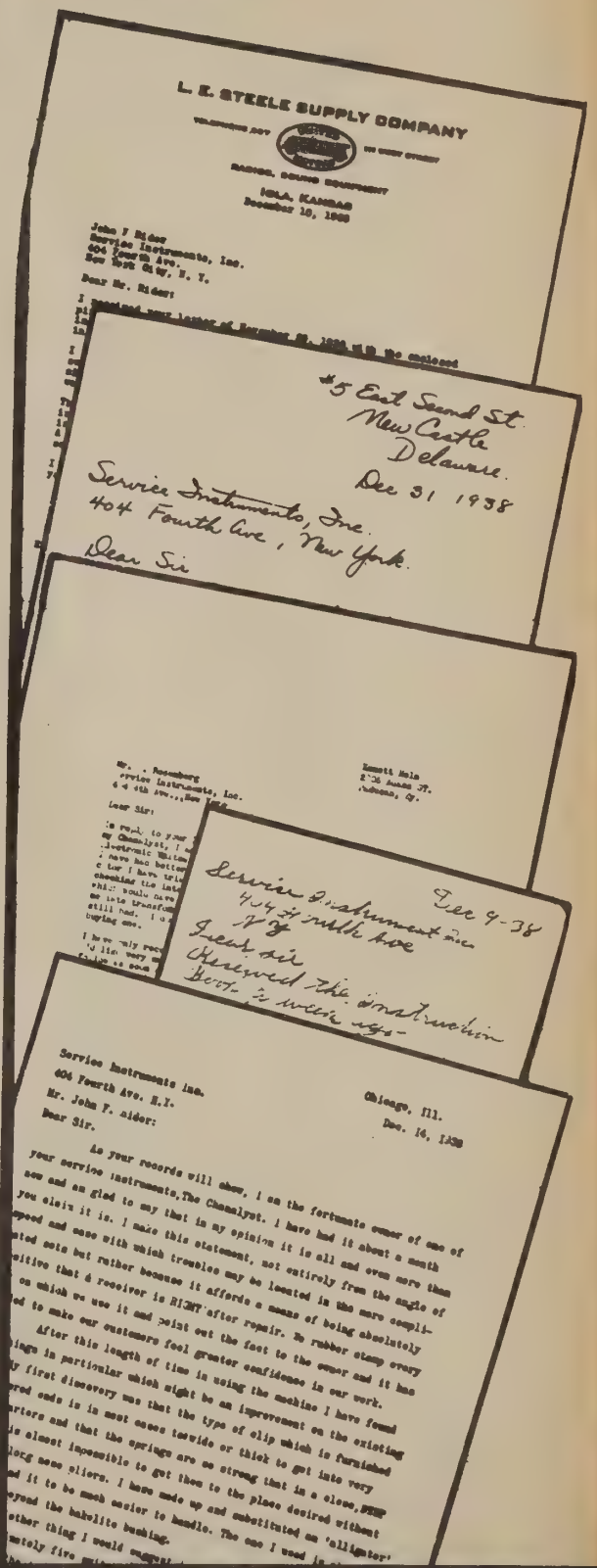
We received the Chanalyst and have been too busy with it to write you. We must say it is just the finest thing out. We have done some jobs with it already that otherwise would have been impossible. All in all, the Chanalyst is just the last word .... it speaks for itself. We would not want to lose the Chanalyst as it is the main instrument in our shop. Many praises to John F. Rider.

Mauk's Radio Repair Shop
DuBois, Pa.

WELL PLEASED WITH PERFORMANCE

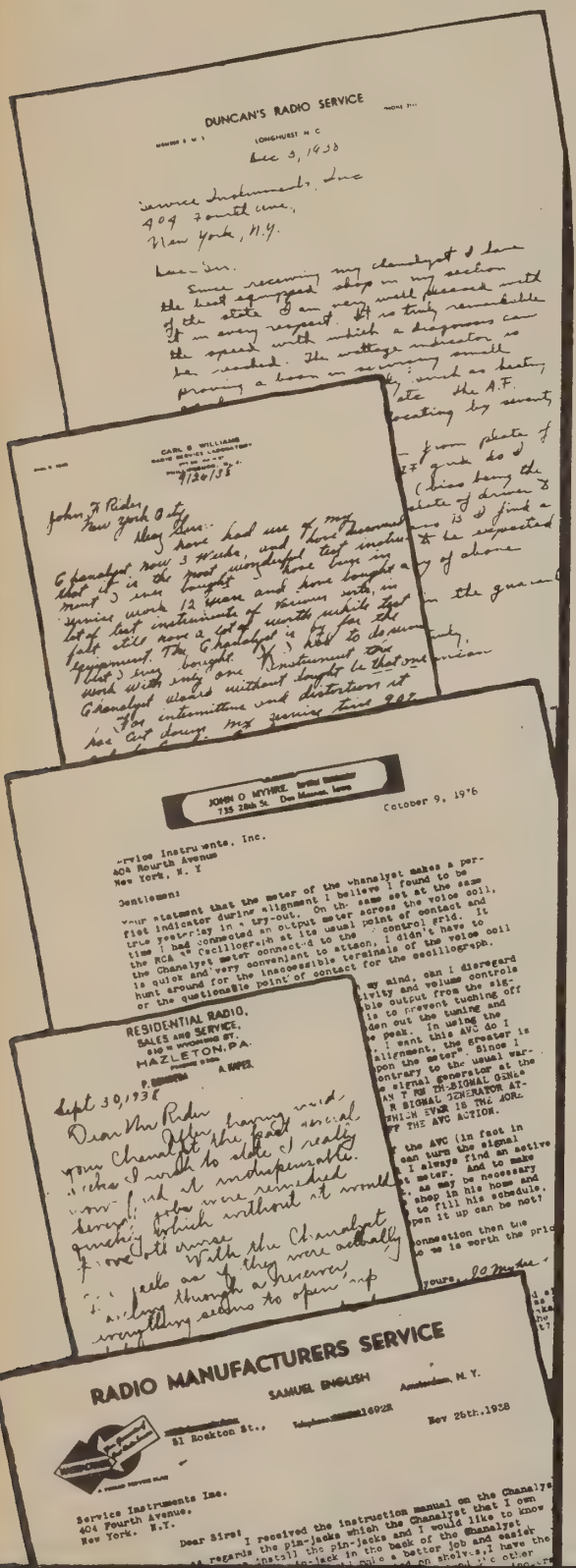
The Chanalyst does all that John Rider claims it will and I have been very well pleased with its performance. Through my recommendation and demonstration, Radio Electric in Wilmington has sold three Chanalysts, so you see that I am well pleased.

Bruce N. Carpenter
New Castle, Del.


L. E. STEELE SUPPLY COMPANY
#5 East Second St.
New Castle
Delaware.
Dec 31 1938
Service Instruments, Inc.
404 Fourth Ave, New York.
Dear Sir
Service Instrument Inc
404 4th Ave N Y
Dear Sir
Received the instruction
Service Instruments Inc.
404 Fourth Ave. N.Y.
Chicago, Ill.
Dec. 16, 1938
Mr. John F. Rider:
Dear Sir.
As your records will show, I am the fortunate owner of one of
your service instruments,The Chanalyst. I have had it about a month
now and am glad to say that in my opinion it is all and even more than
you claim it is. I make this statement, not entirely from the angle of
speed and ease with which troubles may be located in the more compli-
cated sets but rather because it affords a means of being absolutely
positive that a receiver is RIGHT after repair. We rubber stamp every
set on which we use it and point out the fact to the owner and it has
served to make our customers feel greater confidence in our work.
After this length of time in using the machine I have found
things in particular which might be an improvement on the existing
model. My first discovery was that the type of clip which is furnished
for the coils is in most cases too wide or thick to get into very
small sockets and that the springs are so strong that in a close,
cramped space it is almost impossible to get them to the place desired without
using some pliers. I have made up and substituted an 'alligator'
and find it to be much easier to handle. The one I used is
beyond the bakelite bushing.
Another thing I would suggest

FAST - EASY - POSITIVE

Prove THE RIDER CHANALYST TO YOURSELF *Get A Demonstration*



CHANALYST HOLDS FIRST PLACE

I like my Chanalyst very much. I have used it on three jobs, two of them being for a dealer. Both these sets could only be made to operate by switching the band switch to the different bands. On one of these sets I found that the oscillator went dead, which was caused by the plates of the oscillator tuning condenser shorting. When these were properly spaced, the set was O. K. I traced the trouble in the other to the teledial shorting switch. The third set was brought to me by a fellow serviceman after he had spent three days trying to locate why the receiver had no volume. In four minutes I located the trouble in the second i-f coil and after this was replaced the set was O.K. I have all kinds of test instruments but the Chanalyst holds first place in my test equipment.

Samuel English
Amsterdam, N. Y.

FIND IT INDISPENSABLE

After having used your Chanalyst for several weeks, I really now find it indispensable. Several jobs were remedied quickly, which without it would have given great difficulty.

Alexander Kapes
Residential Sales & Serv.
Hazleton, Pa.

REDUCES SERVICE TIME 90%

I have had my Chanalyst three weeks and have discovered that it is the most wonderful test instrument I ever bought. I have been in service work 12 years and have bought a lot of test instruments of various sorts —— in fact I have some really worthwhile equipment —— but the Chanalyst is by far the best I ever bought. If I had to do service work with only one instrument, the Chanalyst would be that one.

For intermittents and distortion, it has cut down my service time 90% and for coupling condensers, you can test them quicker than you can pick up a soldering iron. I have an expensive vacuum-tube voltmeter, but the Electronic Voltmeter in the Chanalyst is easier to use and much better all the way.

Carl B. Williams
Radio Service Laboratory
Phillipsburgh, N. J.

BEST EQUIPPED SHOP NOW IN SECTION

Since receiving my Chanalyst I have the best equipped shop in my section of the state. I am very well pleased with it in every respect. It is truly remarkable the speed with which a diagnosis can be reached. The wattage indicator is proving a boon in servicing small appliances, especially heating pads, toasters, electric razors, etc. The A-F channel has cut "hum locating" by 75%.

G. C. Duncan
Duncan's Radio Service
Longhurst, N. C.

The RIDER Chanalyst

RCA
"HIS MASTER'S VOICE"